

BBC SPACE WAR THE NEW ARMS RACE ABOVE OUR HEADS

# FOCUS

SCIENCE | TECHNOLOGY | HEALTH

## THE POWER OF LAZINESS

WHY IT'S THE ULTIMATE EVOLUTIONARY STRATEGY

PLUS

WHY TAKING IT EASY IS GOOD FOR YOUR BRAIN, YOUR BODY AND THE PLANET



### SLOWING DOWN CLIMATE CHANGE

How an Ice Age Jurassic Park could cool the planet

#### HAWKING'S LAST HURRAH

How his final words were beamed into a black hole

#### RETHINKING THE NEANDERTHALS

Why they weren't so different from us

#### MARTIAN DISCOVERY

Ingredients for life found beneath planet's surface



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Bees can count  
→ p23

# WELCOME



Laziness gets a bad rep. You see, I like to spend my time off occasionally embracing my inner loaf, but if someone asks me what I got up to at the weekend, I can't really admit that I spent the last 48 hours on my sofa, only moving for biological functions, while eating take-away pizzas for breakfast and dinner. I'll admit it's not a pretty picture, but the problem is, the modern world hatters you with the idea that you've got to do more "stuff". The kind of "stuff" you can regale your colleagues with on Monday and bombard your friends with on social media. And the pressure is never higher than in the summer. So for those of you with bones as lazy as mine – here's a treat. This issue we give you a whole bunch of reasons to embrace your inner sloth. I can't be bothered to share them with you here, so turn to p28 to find out more.

Summer is also a time when the changing climate becomes hard to ignore. I have some good news and some bad news. The bad news is that some scientists think that the greenhouse effect is about to get much stronger. As the Siberian permafrosts become, well, less permanent, bacteria will start to feed on the matter buried beneath the ice, releasing millions of tonnes of CO<sub>2</sub> into the atmosphere. The good news is that a father and son have a plan, and it involves a mammoth, some bison and a truck... Find out what on Earth I'm talking about on p61.

Enjoy the issue!

*Daniel Bernhoff*

Daniel Bernhoff, Editor

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### ANTONIO MARTINHO-TRUSWELL

What's so great about it? It's that makes us human. Antonio is intelligent. In fact, Antonio has known suggestions. Sighs... → p10



### HELEN PILCHER

Biophysicist and writer. Zojo glories could help keep the Siberian permafrost frozen. Science writer and radio host for Higher Self. See more → p68



### REBECCA WRAGG SYKES

Our fundamental knowledge is being undermined. Prehistoric archaeologist. Rebecca is a campaigner for our relatives. → p24

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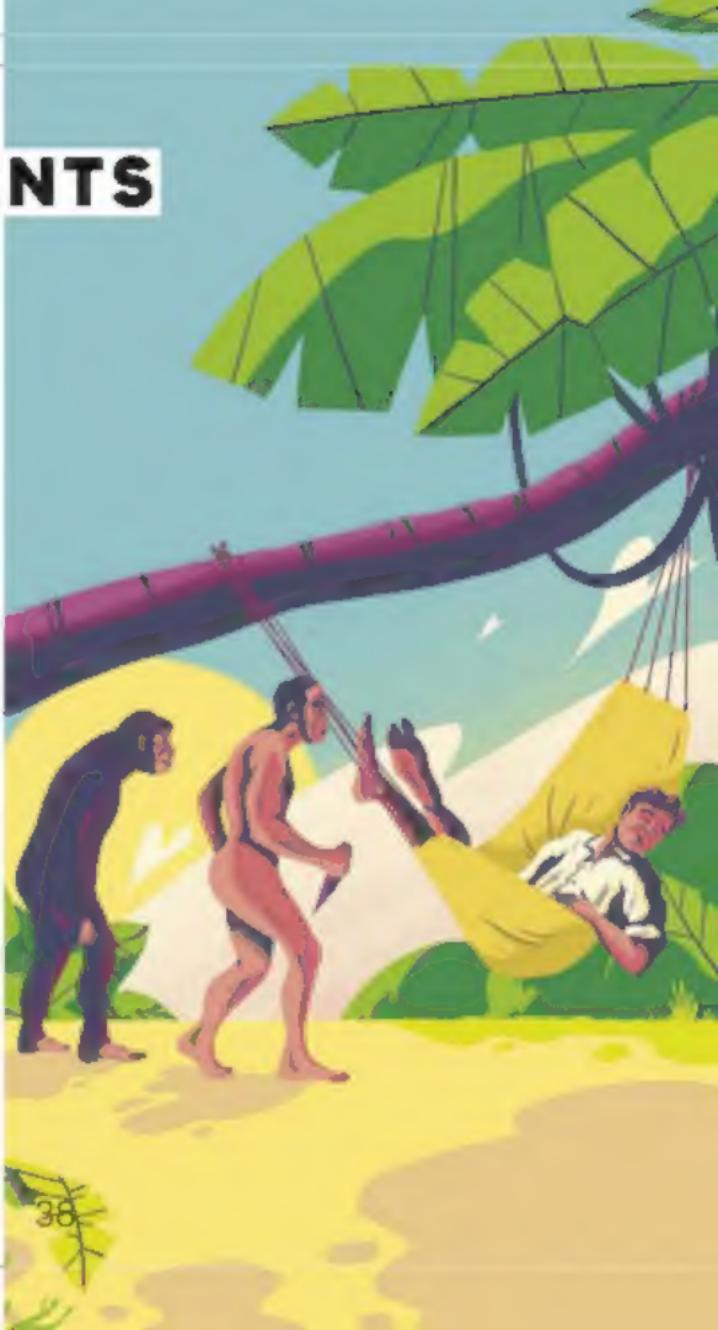
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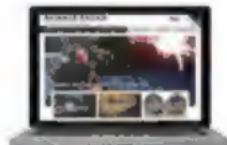
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Can't wait until next month to get your fix of science and tech? The *Science Focus* website is packed with news, articles and Q&As to keep your brain satisfied. [sciencefocus.com](http://sciencefocus.com)



### SPECIAL ISSUE



ON  
SALE  
NOW

#### MIND-BENDING SCIENCE SIMPLY EXPLAINED

In this special edition from *BBC Focus*, we investigate some weird science, such as wormholes, quantum physics, space-time and gravitational waves. [bbcsciencecollection.com](http://bbcsciencecollection.com)

Eye Opener

## Fishy feet

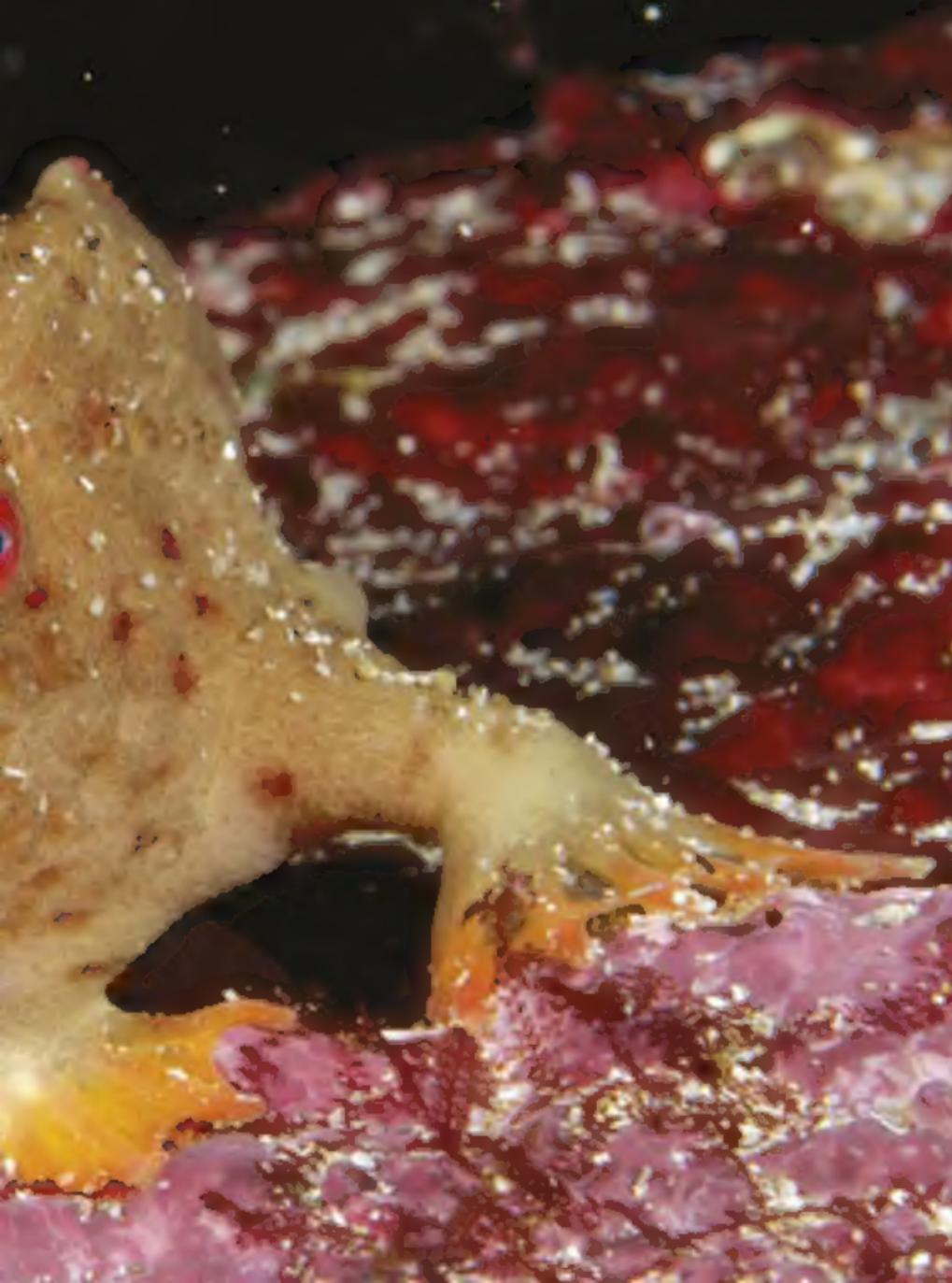
TASMANIA,  
AUSTRALIA

The red handfish, found off the southeast coast of Tasmania, uses its "hands," which are modified fins, to crawl across the bottom of the seafloor. It doesn't travel very far or fast, which restricts populations to small areas.

Classed as critically endangered, it faces threats from habitat degradation and low reproductive rates. Often called the world's rarest fish, scientists only knew of one population, numbering between 20 and 40 fish, until divers discovered a second population earlier this year.

"Finding this second population is a big relief as it essentially doubles the number of individuals we thought were left on Earth," says diver Antonia Cooper. "It provides hope that other small populations may still exist and allows scientists to start discussing conservation options such as habitat protection and the viability of a captive breeding program."





## EYE OPENER

# Aviation impact

LOS ANGELES,

Last year a record 84 million passengers passed through Los Angeles International Airport, pictured here. That number is growing: the International Air Transport Association (IATA) predicts that global air passenger numbers will nearly double by 2036. This leads to concerns over aviation's contribution to global carbon emissions, as it's been estimated that 2 per cent of human-made CO<sub>2</sub> emissions currently come from air travel.

IATA aims to deliver carbon-neutral growth from 2020, and provides an offset scheme in which member states can compensate for their emissions by financing a reduction elsewhere.

Individually, the Civil Aviation Authority advises the best way to reduce your CO<sub>2</sub> emissions from flying is to moderate your air travel where possible, choose more modern aircraft, purchase economy tickets and fly with airlines with lower CO<sub>2</sub> performance figures.





# REPLY

Your opinions on science, technology and *BBC Focus*

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## MESSAGE OF THE MONTH

### Blind in the mind

At work recently a colleague was telling me how he discovered he had aphantasia after his cousin told him about the condition and "blew his mind". Congenital aphantasia is a term that was coined in 2003 to describe people with little or no mind's eye – meaning they can't conjure up pictures or even architectures in their heads.

It was a revelation to me as well. I didn't realise that people could 'see' and 'hear' things inside their own heads but after a lot of talk... and taster at my expense, I learnt that others can, and often experience it in a lot of detail.

I'd love to see an article about aphantasia in *BBC Focus* because it apparently affects 1 in 30 people and I struggle to understand what life is like for those with a 'gated' mind's eye. Personally, my mind is generally description-based – I don't 'see' things so much as describe them to myself, and can only 'hear' music, indirectly by hearing the tune in my head.

Marten Kilbyde, via email

Q After Your letter to David (a lot of heat scratching in the office) And it's caused a lot of questions - what appears it means with you to think of an elephant? Do you use the word instead of the animal? And what goes on in your head you're reading? David it's got us puzzled and wondering what, if any, consequences the

consequences are... – Daniel Bannister, editor



The CO<sub>2</sub> generated in the manufacture of electric cars is offset by their lower emissions once they're on the road

### WHITE IN AND WIN

£100 worth of free toys!  
£100 off the price of a  
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wide range of angles). Plus,  
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point of 1000 when  
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### Batteries not included

Why did Jack Stewart's otherwise excellent article on 'How green are electric cars?' (June, p17) not take into account the CO<sub>2</sub> emissions of building and recycling the vehicles, in addition to the emissions of running them? These should also be considered, especially in respect of the batteries.

Andrew Holt, via email

Q The combination of health, marine and environmental concerns regarding environmental impacts, and you could create a career out of quantifying them. Luckily for us, someone has the brain of a communications whiz. In a 2015 analysis, they found that emissions from manufacturing cars with batteries cause 10–18 per cent higher air pollution (ie, however, that's soon offset

when the cars hit the road, where lower emissions from recycling make up the deficit in 6 to 18 months). Responsibility-ranking and recycling batteries for better energy storage, so to reduce the deficit. Silicon and some non-metallic ingredients, can help reduce the impact further. – Jackie Stewart

### Recollections revisited

Reading Philip Ball's feature in July's issue (July, p13) brought to mind one of my clearest childhood memories of a camping holiday.

Everything had been packed away, except the tent in which my mother and I sheltered from the rain while my father went off in the car to collect something. He'd been gone a long time and we were getting worried when he and our car reappeared being towed into the site by a shore horse!



"I would be at it more than twice a week  
the wages but for strength my mother  
persuaded her that although the event  
she taught him that he can't afford to  
lose his boy.

initially stated if impossible to  
have a child, but decided to  
try a surrogate mother. The  
mother being known has been  
selected in whom we would have been  
able to trust. She has been  
selected and is now pregnant.  
Baptist Hospital where she was  
admitted to the hospital  
prematurely scheduled to make her part  
of the program.

#### **What we want from you**

“*Wā’idū ṣubqatū*” is the second line “*Wa-  
bihiha hawā’i dīqā’iha*” (verse  
108) but with half of it left to  
be read.

With old patients, the right arm is often more involved than the left, and the right hand is often more involved than the left. The right arm is often more involved than the left, and the right hand is often more involved than the left.

After all this time you still have  
that sick bear in your office now?

100000

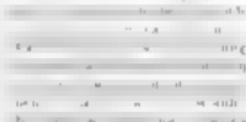


Intergalactic war was avoided just like Earth had wanted. This happened with me helping the crew during about a year I believe.

9.  $\Delta t = \frac{1}{n}$       10.  $\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{1}{k^2} = \pi^2$

has been forwarded to

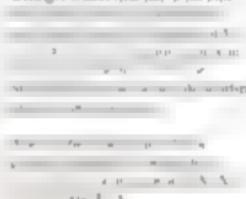
then might also be characterized as



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Part

In the former case the  $\langle \bar{q} q \rangle$  of width



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FOCUS

34 1000  
Empathy 0.7 - 0.9  
Sensitivity 0.6

	$\tau_1$	$\tau_2$	$\tau_3$	$\tau_4$	$\tau_5$
before	0.0	0.0	0.0	0.0	0.0
at 1	0.0	0.0	0.0	0.0	0.0
at 2	0.0	0.0	0.0	0.0	0.0
at 3	0.0	0.0	0.0	0.0	0.0
at 4	0.0	0.0	0.0	0.0	0.0
at 5	0.0	0.0	0.0	0.0	0.0
at 6	0.0	0.0	0.0	0.0	0.0
at 7	0.0	0.0	0.0	0.0	0.0
at 8	0.0	0.0	0.0	0.0	0.0
at 9	0.0	0.0	0.0	0.0	0.0
at 10	0.0	0.0	0.0	0.0	0.0

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Գումար առ առ առ առ առ առ առ առ առ

For  $\alpha \neq 0$ ,  
 $\lim_{n \rightarrow \infty} x_n = \alpha$  and  
 $\lim_{n \rightarrow \infty} y_n = \beta$ .

לען־ה  
הנִזְמָן  
בְּמַעֲשֵׂי־  
בְּמַעֲשֵׂי־

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100

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# DISCOVERIES

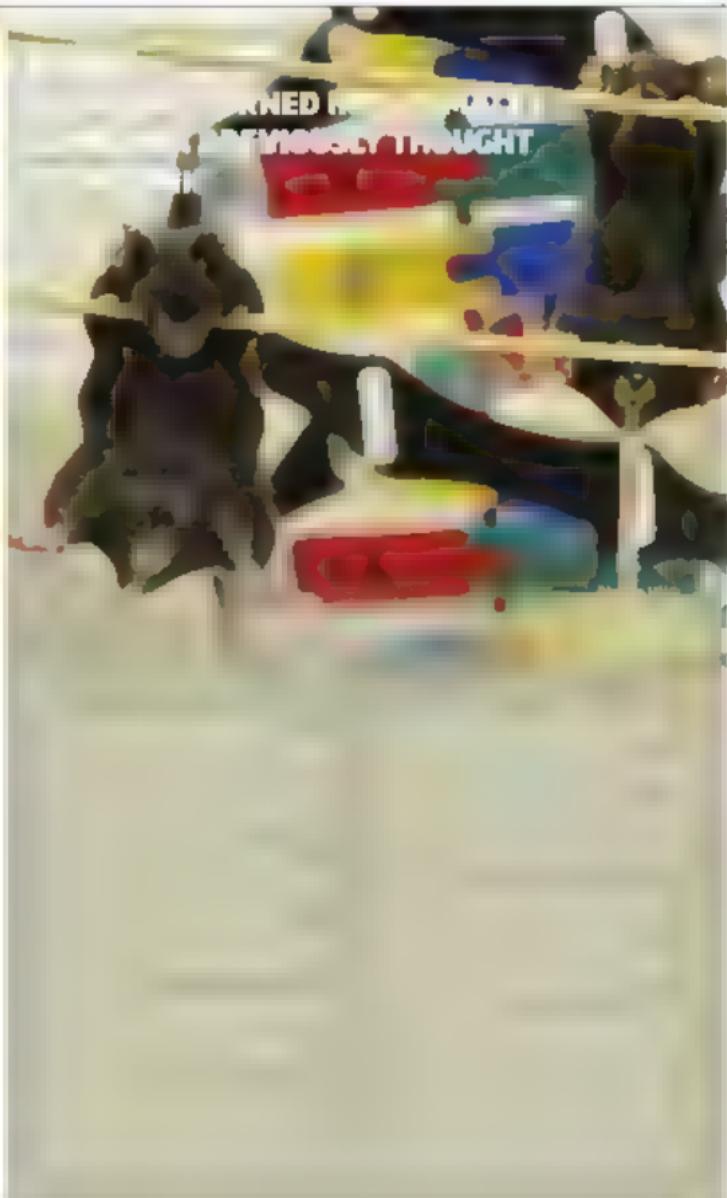
D SPATCHES FROM THE CUTTING EDGE





• **Pre-**  
Express flight  
Round-trip  
based on plane  
capacity  
Indicates flight  
after departing  
from Marion surface

• Conditions on  
flight will change  
as the vehicle  
gets higher or lower  
the ground



JULY 2014

# INCAN SURGEONS WERE SURPRISINGLY SKILLED AT DRILLING HOLES IN PEOPLE'S SKULLS



Trepanation – the act of removing a portion of the skull or drilling an opening into a patient's cranium to treat everything from headwounds to seizures, or even supposed demonic possession – is a practice largely confined to the past. But if you were ever in need of such an operation, you would do a lot worse than seeking out an Incan surgeon.

After analysing 200 ancient skulls found by force that had undergone trepanation, a team at the University of Illinois found that the procedures were carried out so expertly that the survival rate was more than 70 per cent – almost double that of those who underwent similar procedures during the American Civil War hundreds of years later. "In Incan times, the mortality rate was between 10 and 25 per cent, and during the Civil War, it was between 40 and 50 per cent. That's a big difference," said Dr David Huddleston, who led the research. "The question is, how did the ancient Peruvians become more advanced than they were in those days?"

Surprisingly, the answer may lie in the

man during the World War may have been a trepanning Romeo, but little is known about exactly how the Peruvians experts performed the operations.

It is thought that supplies, or more accurately the lack of it, during the Civil War, may have contributed to the higher mortality rate in the latter period. According to the study, which relied on another John W. Young's extensive field research on trepanation over a nearly 2,000-year period in Peru and a review of the evidence, Incan chief surgeons around the world, Civil War surgeons often used unsterilised medical tools and their hands to probe open wound sinuses or break up blood clots.

"We do not know how the ancient Peruvians performed trepanation, but it seems that they did a good job of it," said Huddleston. "Whether do we know what they used as anaesthetics, but when there were so many trepanned survivors they must have used something – probably some booze. Maybe there was something else. Something a fermented beverage. There are no written records, so we just don't know."

**WHAT'S NEW**  
A team of researchers has found that ancient Peruvians were far more skilled at performing trepanation than their Civil War counterparts.

By Helen Phillips



## THIS TINY BEETLE HAS BEEN STUCK IN AMBER FOR 99 MILLION YEARS

Right before Pap. 100 years ago. Right after  
the first one, he was the first to find it.  
Now, he's been stuck in amber for 99 million  
years. It's the oldest known specimen of its kind.  
And it's just one of many fossils found in a  
small piece of amber from southern China.  
The beetles were part of a massive ecosystem  
that existed millions of years ago. They  
lived in forests, ate plants, and died. Their  
bodies were preserved in the sticky resin,  
which eventually turned into amber. This  
process took millions of years, but it  
resulted in some of the most well-preserved  
fossils ever found.

Year	Event	Location	Age	Significance
1990	First amber specimen found	Southern China	99 million years old	Oldest known specimen
1995	More specimens found	Southern China	99 million years old	Large collection
2000	Specimens found in Europe	Various locations	99 million years old	International interest
2010	Specimens found in North America	Various locations	99 million years old	Global distribution
2020	Specimens found in Australia	Australia	99 million years old	Continents spanned

This is just the beginning  
stage of the  
development process in  
the 99-million-year-old

## IN NUMBERS

# 103 BPM

The ideal rate for performing best compressions when administering CPR, as found by a team at the University of Barcelona. It also happens to be the tempo of the chorus in the pop song "Macarena," they say.

# 546

The age of a set of footprints made by an unknown animal in southern China—the oldest of any found to date.

# 6 HOURS

The length of one day on Earth have increased in the last 1.4 billion years, thanks to the fact that the Moon is gradually moving away from us. This happens as the relative position of the Moon affects the rotational speed of the Earth much as the arms of a spinning figure skater affects their speed.

Dolphins are phenomenally good at using echo location, much better than man-made devices'

*Dolphins se holocate with two-part acoustic beams. Dr Josefina Starkhammar of Lund University explains how this could help us improve ultrasound technology*

Why do dentists refer to Prosthetic?

d	p	q, q'	$\frac{p}{q} \cdot \frac{p}{q'} = \frac{1}{d}$	$\frac{p}{q} + \frac{p}{q'} = \frac{2p}{d}$
1	1	1, 1	1	2
2	1, 2	1, 2	1/2	3/2
3	1, 2, 3	1, 2, 3	1/3	2/3
4	1, 2, 3, 4	1, 2, 3, 4	1/4	5/4
5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1/5	6/5
6	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6	1/6	7/6
7	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7	1/7	8/7
8	1, 2, 3, 4, 5, 6, 7, 8	1, 2, 3, 4, 5, 6, 7, 8	1/8	9/8

How do these numbers compare to yours?

Group	Mean	SD	N	Significance
High	10.0	1.0	10	—
Low	9.0	1.0	10	—
Significance				
High vs Low	1.0	0.0	10	* p < .05
High vs All	1.0	0.0	20	* p < .05
Low vs All	1.0	0.0	20	* p < .05
Significance				
High vs Low	1.0	0.0	10	* p < .05
High vs All	1.0	0.0	20	* p < .05
Low vs All	1.0	0.0	20	* p < .05

Many other names and other definitions exist for it.

What did you discover about the bacteria?

--



By Tom Hargrave  
published in association  
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and with *Book  
Reviews* (London).  
Reprinted by arrangement  
with the publishers.  
The author is a London  
lecturer, which  
is about all his secret  
signs are two-fifths

#### What are the practical applications?

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760	770	780	790	800	810	820	830	840	850	860	870	880	890	900	910	920	930	940	950	960	970	980	990	1000	1010	1020	1030	1040	1050	1060	1070	1080	1090	1100	1110	1120	1130	1140	1150	1160	1170	1180	1190	1200	1210	1220	1230	1240	1250	1260	1270	1280	1290	1300	1310	1320	1330	1340	1350	1360	1370	1380	1390	1400	1410	1420	1430	1440	1450	1460	1470	1480	1490	1500	1510	1520	1530	1540	1550	1560	1570	1580	1590	1600	1610	1620	1630	1640	1650	1660	1670	1680	1690	1700	1710	1720	1730	1740	1750	1760	1770	1780	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500	4600	4700	4800	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000	6100	6200	6300	6400	6500	6600	6700	6800	6900	7000	7100	7200	7300	7400	7500	7600	7700	7800	7900	8000	8100	8200	8300	8400	8500	8600	8700	8800	8900	9000	9100	9200	9300	9400	9500	9600	9700	9800	9900	10000	10100	10200	10300	10400	10500	10600	10700	10800	10900	11000	11100	11200	11300	11400	11500	11600	11700	11800	11900	12000	12100	12200	12300	12400	12500	12600	12700	12800	12900	13000	13100	13200	13300	13400	13500	13600	13700	13800	13900	14000	14100	14200	14300	14400	14500	14600	14700	14800	14900	15000	15100	15200	15300	15400	15500	15600	15700	15800	15900	16000	16100	16200	16300	16400	16500	16600	16700	16800	16900	17000	17100	17200	17300	17400	17500	17600	17700	17800	17900	18000	18100	18200	18300	18400	18500	18600	18700	18800	18900	19000	19100	19200	19300	19400	19500	19600	19700	19800	19900	20000	21000	22000	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	34000	35000	36000	37000	38000	39000	40000	41000	42000	43000	44000	45000	46000	47000	48000	49000	50000	51000	52000	53000	54000	55000	56000	57000	58000	59000	60000	61000	62000	63000	64000	65000	66000	67000	68000	69000	70000	71000	72000	73000	74000	75000	76000	77000	78000	79000	80000	81000	82000	83000	84000	85000	86000	87000	88000	89000	90000	91000	92000	93000	94000	95000	96000	97000	98000	99000	100000
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Want to boost the effectiveness of your team? Make a cup of tea! Researchers at Ohio State University found that drinking a cup of tea before a group discussion may make participants more talkative, more positive and more engaged when carrying out the task.

If you want to remember something, don't take a picture. Taking a snap of something impairs our ability to recall it later, researchers at the University of California have found. It's unclear why but it may be due to us paying less attention to an experience when we know it'll be safely stored, they say.



# TRENDING

Your guide to the hottest topics in the world right now.

## #MICROBIOME

### MICROBIOME PROFILE: HUMANS

Region	Microbiome	Age	Health
Breast milk	Infant gut	0-12 months	Immature
Human skin	Adult gut	12-18 months	Developing
Breast milk	Adult gut	18-36 months	Developed
Breast milk	Adult gut	36-60 months	Stable
Breast milk	Adult gut	60+ months	Mature
Breast milk	Adult gut	60+ months	Optimal

### GUT MICROBIOME PROFILE: HUMANS

Region	Microbiome	Age
Breast milk	Infant gut	0-12 months
Breast milk	Adult gut	12-18 months
Breast milk	Adult gut	18-36 months
Breast milk	Adult gut	36-60 months
Breast milk	Adult gut	60+ months

### HUMAN MICROBIOME PROFILE: ANIMALS

Region	Microbiome	Age
Breast milk	Infant gut	0-12 months
Breast milk	Adult gut	12-18 months
Breast milk	Adult gut	18-36 months
Breast milk	Adult gut	36-60 months
Breast milk	Adult gut	60+ months



## #CLIMATE CHANGE



## #PLASTICS

**THE PLASTIC POLLUTION CRISIS**

Plastic waste is a major environmental problem. It's polluting our oceans, harming marine life, and contributing to climate change. Here's what you can do to help.

- REDUCE:** Avoid single-use plastics like straws, bags, and utensils.
- REUSE:** Bring your own reusable bags, water bottles, and containers.
- RECYCLE:** Properly dispose of plastic waste in recycling bins.
- REFUSE:** Say no to plastic when given the option.
- REFILL:** Use refillable containers for personal care products.
- RETHINK:** Choose products made from sustainable materials.
- REINVENT:** Support companies that are finding innovative ways to reduce plastic waste.

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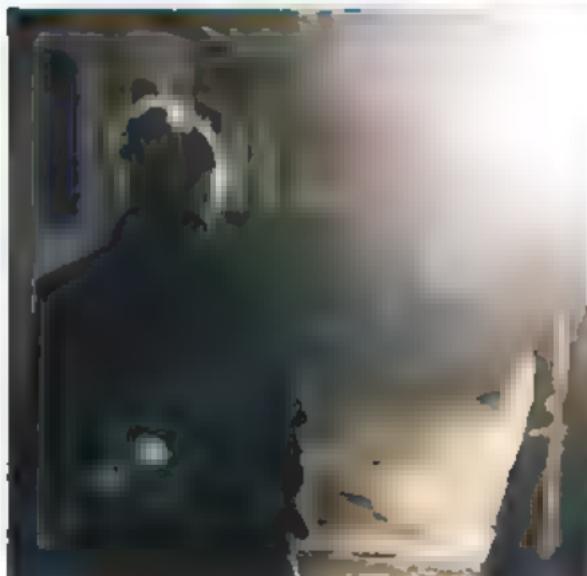
## #SLEEP

### THE DANGERS OF SLEEP DEPRIVATION

Activity	Impact
Driving	Impaired judgment and reaction time
Operating machinery	Increased risk of accidents
Working	Reduced productivity and focus
Learning	Impaired memory and comprehension
Relationships	Strained relationships due to moodiness
Health	Increased risk of chronic diseases
Safety	Decreased safety for individuals and society

### BEST PRACTICES FOR BETTER SLEEP

Practice	Benefit
Establish a routine	Helps regulate the body's circadian rhythms
Avoid screens before bed	Reduces blue light exposure and promotes relaxation
Exercise regularly	Improves sleep quality and duration
Limit caffeine and alcohol	Reduces disrupted sleep and improves overall health
Create a comfortable sleep environment	Optimizes temperature, lighting, and noise levels for restful sleep
Use relaxation techniques	Reduces stress and promotes better sleep quality
Establish a pre-sleep ritual	Creates a positive association with sleep and promotes relaxation
Get enough sunlight during the day	Helps regulate the body's internal clock and promotes better sleep at night



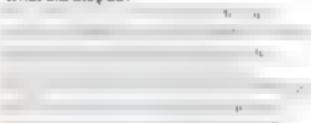


Is it possible that you communicate like this to your mate?

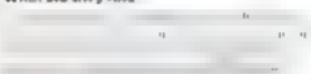
## THEY DID WHAT!?

### MATHS TAUGHT TO BEES

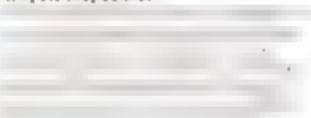
What did they do?



What did they find?



Why did they do that?



## PSYCHEDELIC DRUGS MAY RESTRUCTURE THE BRAIN

The findings suggest that LSD may alter the brain's internal communication system, which may explain why users feel altered and different after taking the drug. The researchers say their findings could lead to new treatments for mental health disorders.

The team used functional MRI (fMRI) to scan the brains of 12 healthy volunteers while they were given a single dose of LSD. They found that the drug increased activity in the prefrontal cortex, which is involved in higher-order cognitive functions such as decision-making and problem-solving. It also reduced activity in the Default Mode Network (DMN), which is active when the mind is at rest.





# HAWKING'S LAST HURRAH

The world famous physicist and author of *A Brief History of Time* is held by most alongside Newton and Darwin



Interest paid by a company on a long-term debt, expressed as a ratio of the firm's total long-term debt to its total assets.

But was such a creature  
of such a nature? I  
had no time to consider it,  
and so I left it.  
I had a long walk  
in the dark, and when  
I reached home, I  
was very tired.  
I lay down on my bed  
and fell asleep.  
When I awoke, it was  
bright and sunny.  
I got up and went  
out to see what had  
happened.  
I found that the  
house was still there,  
but the garden was  
gone.  
I asked my wife  
what had happened.  
She said that she  
had been sleeping  
when she heard a  
noise outside.  
She got up and  
looked out the window,  
and saw a large  
black dog standing  
in the garden.  
She screamed and  
ran back into the  
house.  
I followed her  
and saw the same  
dog standing  
in the garden.  
I tried to drive  
it away, but it  
would not leave.  
I called for help,  
but no one came.  
I decided to leave  
the house and go  
to a friend's house  
until the dog  
left.  
I packed my bags  
and left.  
I walked for hours  
until I found a  
house where I  
could stay.  
I knocked on the  
door and a woman  
opened it.  
She invited me  
in and gave me  
a place to sleep.  
I stayed there  
for several days  
until the dog  
left.  
I never saw  
that dog again.

**"ONE OF THE GREAT REVELATIONS OF THE  
SPACE AGE HAS BEEN A PERSPECTIVE IT HAS  
GIVEN HUMANITY ON OURSELVES"**



Editorial Board and Reviewers



Munich's students only had University degrees at their disposal

higher than 30 years old, it has been  
highly appreciated, especially among  
adults in their 30s and 40s. In  
addition, it has been more popular  
among men than women.  
• **Education:**  
Students aged 18 to 24  
and 25 to 34 have been  
the most educated group,  
with 60 percent having  
longer than a high school  
education. In contrast,  
adults aged 35 to 44  
and 45 to 54 have been  
the least educated group,  
with only 40 percent  
having completed  
postsecondary  
education. This  
difference may be  
due to the fact that  
adults aged 35 to 44  
and 45 to 54 were  
born during the  
post-World War II  
baby boom, while  
adults aged 18 to 24  
and 25 to 34 were  
born during the  
post-World War II  
baby bust.



Germany's most educated group was of foreign residence, thus coming place third



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# SCIENCE FOCUS PODCAST

In each episode, we talk to some of the brightest minds in science about the ideas shaping our future:



and much, much more

# "COULD DIFFERENT MEALTIMES MAKE YOU HEALTHIER?"

DR MICHAEL MOSLEY

TIME  
TWO



**S**cientists have been looking at different meal times and it's not just about when you eat, it's also about what you eat. For example, if you eat a meal at night, it's more likely to be higher in carbohydrates and fats than a meal at lunchtime. This means that the body has to work harder to digest the food, which can lead to weight gain. In fact, studies have shown that people who eat their main meal at night tend to gain weight faster than those who eat it during the day. So, if you're trying to lose weight, it might be better to have your main meal earlier in the day.

TIME OF DAY	MEAL TYPE	MEAL SIZE
Morning	Breakfast	Small
Midday	Lunch	Medium
Evening	Dinner	Large
Night	Supper	Very Large

So, how does this affect our health? Well, it's not just about the timing of meals; it's also about the quality of the food. For example, if you eat a meal at night, it's more likely to be higher in carbohydrates and fats than a meal at lunchtime. This means that the body has to work harder to digest the food, which can lead to weight gain. In fact, studies have shown that people who eat their main meal at night tend to gain weight faster than those who eat it during the day. So, if you're trying to lose weight, it might be better to have your main meal earlier in the day.

Dr. Michael Mosley is a nutritionist and author of *The Big Eat Clean Diet*.



**URGENT**

# Hundreds of children have already lost so much. Now they stand to lose even more.

From the start of the Indonesian tsunami, thousands of children's lives and homes could be washed away in an instant. Diseases and malnutrition, if left untreated, will be at risk of deadly outbreaks. Measles, cholera and diphtheria.

That's why

Please help us to protect their children and help them to survive.

**£75**

Give online at [unhcr.org/rohingya](http://unhcr.org/rohingya) or call us on 020 3761 9525

Or post urgently to: UNHCR - York House, Wetherby Road, Long Marston, York, YO26 7NH

Please tick next to my gift:

£75     £150     £375     Other £

I would like to receive regular updates from UNHCR

I would like to receive a copy of the UNHCR Annual Report

I would like to receive information about UNHCR's work in Bangladesh

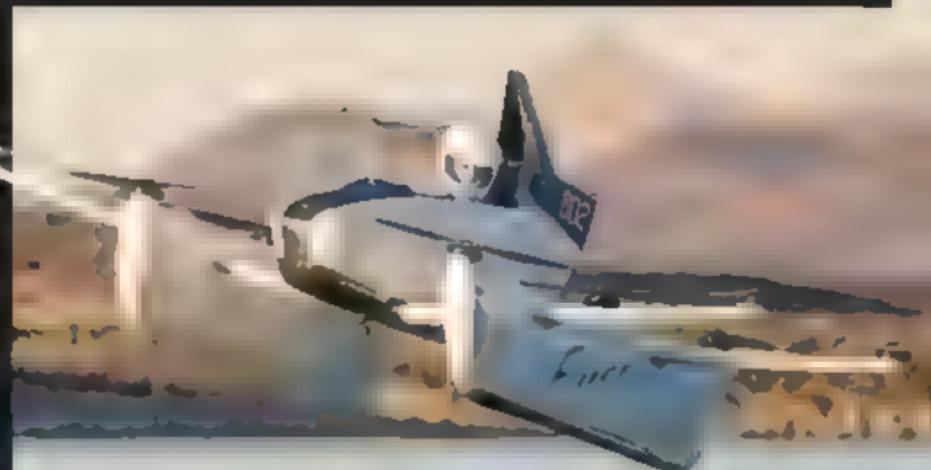
I would like to receive information about UNHCR's work in Jordan

I would like to receive information about UNHCR's work in Lebanon



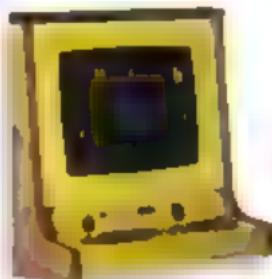
# INNOVATIONS

**PREPARE YOURSELF FOR TOMORROW**



# FLYING SOLO

--



## WANTED

**Neuro**  
Neuro is a small, multi-functional device  
with a variety of different sensors.  
It can measure heart rate,  
respiration, blood pressure,  
and more. It also has a built-in  
GPS and a speaker.  
Analyze the data with  
your phone.

[www.neuro.com](http://www.neuro.com)

**Pi**  
Pi is a high-end robot.  
It has a 3D printer, a  
camera, and a  
microphone.  
It can print objects  
and take pictures.  
It also has a  
GPS and a speaker.  
Analyze the data with  
your phone.

[www.pi.com](http://www.pi.com)

**Watch**  
The Watch is a multi-functional device.  
It can measure heart rate,  
blood pressure, and more.  
It also has a GPS and a speaker.  
Analyze the data with  
your phone.

[www.watch.com](http://www.watch.com)

**Smart Wall**  
Smart Wall is a wall-mounted device  
that can detect motion.  
It can also detect  
temperature and humidity.  
It can also detect  
light levels and noise levels.  
Analyze the data with  
your phone.

[www.smartwall.com](http://www.smartwall.com)

**Drone**  
Drone is a quadcopter drone.  
It has a camera and a  
GPS. It can fly in  
any direction and  
take pictures.  
Analyze the data with  
your phone.

[www.drone.com](http://www.drone.com)

**Smart Wall**  
Smart Wall is a wall-mounted device  
that can detect motion.  
It can also detect  
temperature and humidity.  
It can also detect  
light levels and noise levels.  
Analyze the data with  
your phone.

[www.smartwall.com](http://www.smartwall.com)

**GAME ON**





## COULD ALGORITHMS HELP DETECT VIOLENCE?

By Benji Hirschman, a software developer at a San Francisco-based startup that uses machine learning to predict violent incidents before they happen.

I started this article by reading the news about the recent shooting in Orlando, and it got me thinking about how we can use technology to prevent something like that from ever happening again. I'm not sure if there's a silver bullet solution, but I do believe that there are ways to help prevent violence before it happens. That's why I've spent the last few months working on a project that aims to do just that.

**What is your project about? The basic idea is to use machine learning to predict**

**violent incidents before they happen.** We're currently

**working on a prototype that uses a neural network**

**to analyze video feeds and detect potential**

**violence based on patterns of movement and**

**body language.** The system is still in its early

**stages, but we're already able to identify**

**potential threats with a high degree of accuracy.**

**How does it work? The basic idea is to**

**use machine learning to predict**

**violent incidents before they happen.** We're

**currently working on a prototype that uses a**

**neural network to analyze video feeds and**

**detect potential violence based on patterns**

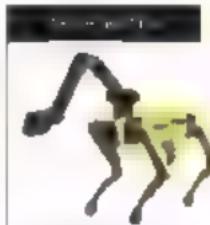
**of movement and body language.**

This algorithm uses  
data from all existing  
violent incidents (past),  
and will be used for  
helping people rate in a  
crowd (future usage).

# AFFORDABLE CARBON CAPTURE TECHNOLOGY IS ON ITS WAY

**SOY SUGAR** can reduce carbon dioxide emissions from power plants by up to 80 percent. The new technique, developed by researchers at the University of Illinois Urbana-Champaign, uses soybean husks to capture CO<sub>2</sub> from flue gas. The team's first test of the system at a power plant in Illinois removed 90 percent of the CO<sub>2</sub> from the plant's exhaust. The researchers say the cost of the process is comparable to existing methods.

**DRONE DANCERS** can now perform synchronized aerial acrobatics. Researchers at the University of Michigan have created a robot that can fly in formation with other robots. The team's first test of the system at a power plant in Illinois removed 90 percent of the CO<sub>2</sub> from the plant's exhaust. The researchers say the cost of the process is comparable to existing methods.



## CANINE PAT

**SPOT-MINI** Boston Dynamics' wheelchair driving robot dog will go on sale next year. It's designed to help disabled people move around their homes. The robot has a non-barking, non-purring barking, non-purring barking,



## PITCH-IT

**MISSES PITCH-IT** an mark out professionals' standard football pitches while still there's sparse on grass, normal, or even gravel. Drawing blood is the problem as the Pitch-It can navigate obstacles.

## DRONE POLLINATION

**A HEAVY DUTY** has pollinated orchard trees at night, which is an effort to improve yields. It could also be used on cold spring days when bees aren't active. Low temperatures don't lead to poor growing seasons.

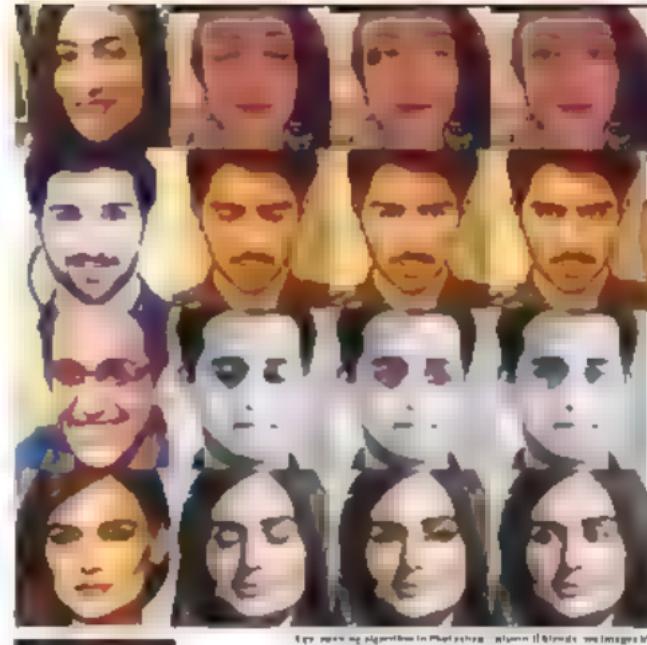
## NEW AT CAN SEE THROUGH WALLS



In X-ray vision, researchers at Florida Institute of Technology have developed a way to see through walls using a combination of ultrasound and visible light.

A team of engineers at Florida Institute of Technology has developed a way to see through walls using a combination of ultrasound and visible light.

The team, led by Dr. Ming Tang, has developed a system that uses a camera to capture images of a scene through a wall. The camera captures images of the scene through a wall using a combination of ultrasound and visible light. The system can capture images of a scene through a wall using a combination of ultrasound and visible light.



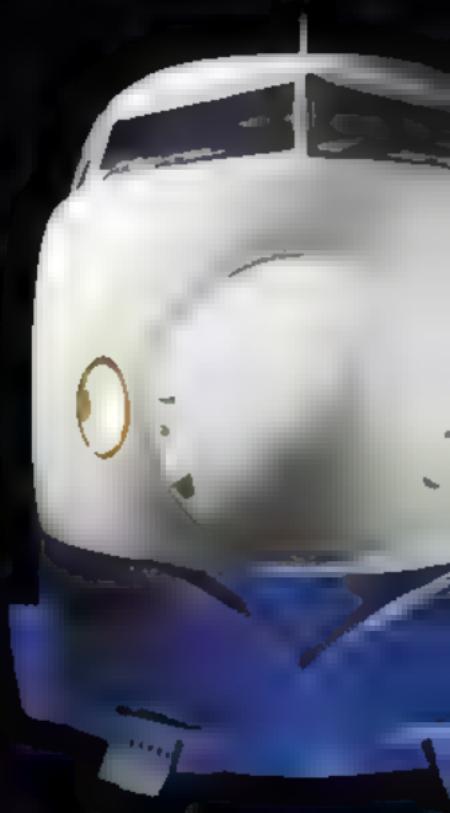
Left: processing algorithm in Photoshop; above: 1) streaks; 2) images of the subject in motion; and 3) Gaussian + proposed technique (column 4)

## FACEBOOK CAN OPEN YOUR EYES

Name	Setting	Method	Age	Gender
John	Office	Method A	35	M
Jane	Home	Method B	28	F
Mike	Office	Method C	42	M
Sarah	Home	Method D	30	F
David	Office	Method E	38	M
Emily	Home	Method F	25	F
Frank	Office	Method G	45	M
Gina	Home	Method H	32	F
Howard	Office	Method I	40	M
Irene	Home	Method J	37	F
James	Office	Method K	39	M
Karen	Home	Method L	34	F
Liam	Office	Method M	41	M
Mia	Home	Method N	31	F
Nicole	Office	Method O	36	M
Oliver	Home	Method P	33	F

Name	Setting	Method	Age	Gender
John	Office	Method A	35	M
Jane	Home	Method B	28	F
Mike	Office	Method C	42	M
Sarah	Home	Method D	30	F
David	Office	Method E	38	M
Emily	Home	Method F	25	F
Frank	Office	Method G	45	M
Gina	Home	Method H	32	F
Howard	Office	Method I	40	M
Irene	Home	Method J	37	F
James	Office	Method K	39	M
Karen	Home	Method L	34	F
Liam	Office	Method M	41	M
Mia	Home	Method N	31	F
Nicole	Office	Method O	36	M
Oliver	Home	Method P	33	F

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# THE POLA





# WER OF ZINNESS

*Laziness gets a bad rap. We're constantly being told we should do more, work harder, maximise productivity. But there's another side to the story. Being lazy, it turns out, can be good for both our physical and our mental health. In fact, it may even be at the heart of what makes us human – and it's certainly a successful strategy for the sloth. Over the next 14 pages, we reveal why it might be time to live life in the slow lane.*

# THE LAWYER RIDE

A

As the new year begins, it's time to take stock of what we've accomplished and what we still have to do. In this issue, we look at some of the most powerful stories in the legal industry. We've put them in perspective, from the latest developments in corporate governance to the future of law firms.



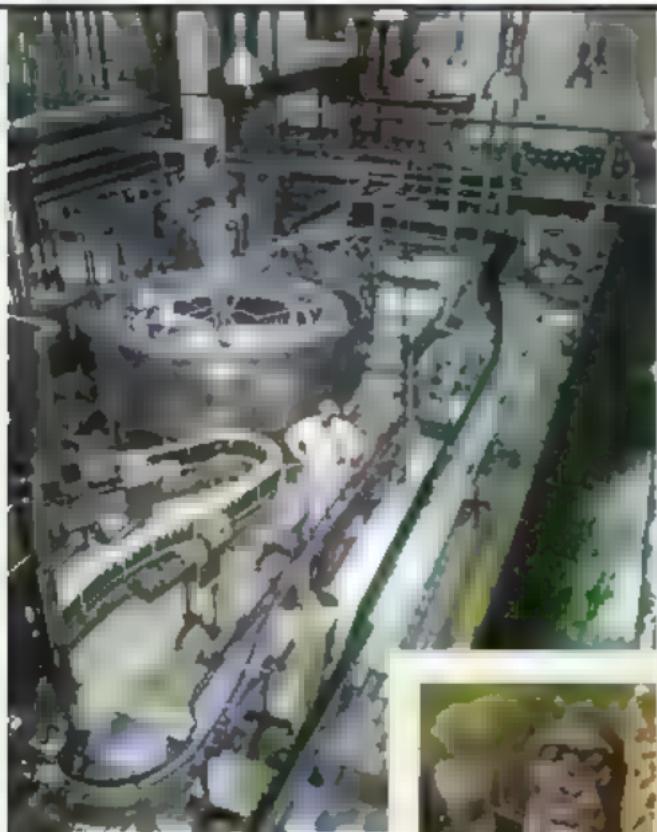
MAY 1954 MATHEMATICS

**"We can be quite judgmental about our lazy peers, but laziness is a valuable adaptation"**



Brueghel's painting of a Peasant Wedding in the Flemish style was the first to depict the peasant wedding in the Flemish style.





**REVIEW**  
Revolting  
processes  
make for  
different

**M**ARY CHAPPE  
Mary Reavis  
mastered the  
art of lapidary,  
but the skills  
required to  
and others  
padding her  
husband

◆ **W**ORKING IN THE STUDIO — Black  
Held behind the scenes, Mary  
Reavis kept her art hidden from  
the public eye. She worked  
alone, creating pieces that  
she sold to friends and  
family. Her work was  
mostly functional, though she  
did create some decorative  
pieces. She had no formal  
training, but she learned  
from her husband, who  
had studied at the  
University of Michigan.  
He taught her how  
to cut and polish  
stones, and she  
soon became  
proficient at it.  
Reavis' work  
was often  
functional,  
but she  
also created  
some  
decorative  
pieces.



her own style. Held in these  
stunning settings, Mary  
Reavis' designs are now  
available to the world.  
Her work is unique and  
beautiful, reflecting the  
care and attention she  
put into each piece.  
She has won many  
awards for her work,  
including the Grand  
Prize at the Michigan  
State Fair. Her pieces  
have been featured  
in numerous publications  
and are now available  
throughout the country.  
Mary Reavis' work is a  
true testament to the  
skill and artistry of  
the woman who created  
it. Her legacy will live  
on through her beautiful  
creations and the  
people who appreciate  
them.

# DON'T WORRY, BE LAZY

It's tempting to kick back and relax over the warm summer days. Happily, there's scientific proof that this is exactly the right thing to do.

BY ANDREW DAWSON / ILLUSTRATION BY KAREN SCHAFFNER

## SLOW DOWN AND IMPROVE YOUR HEALTH

*Taking time out from the daily grind can benefit both body and mind*

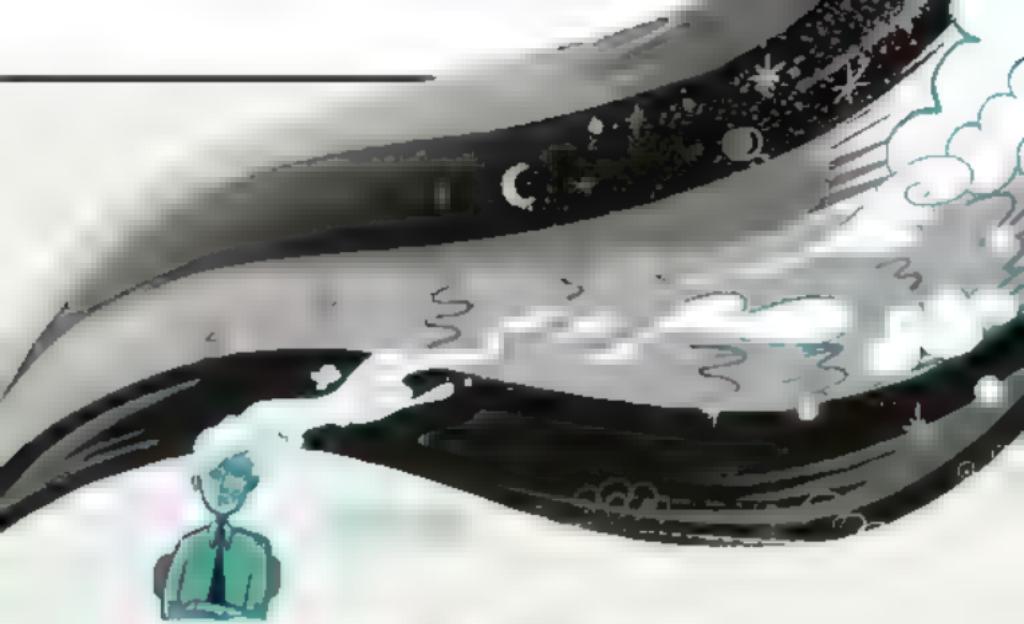
**I**t's time to put down the phone, turn off the computer, and take a break. You're not alone. In fact, you're part of a growing trend. "There's a real shift in attitude toward work," says Dr. Michael Kirsch, author of *Work Less, Live More*. "People are more willing to take time off." And it's not just about getting away from work; it's also about getting away from work. "It's important to take time off to recharge your batteries," says Dr. Kirsch. "When you're constantly working, you're not giving your body and mind the chance to rest and regenerate." So if you're feeling overwhelmed by work, take a break. You'll feel better—and you might even find some unexpected benefits along the way.

"There are signs of recognition all around us," says Dr. Kirsch. "People are taking more vacation days, and more companies are offering them. It's a sign that people are becoming more aware of the importance of downtime. And it's not just physical health that benefits from taking time off. Mental health is also improved by taking time off. When you're constantly working, you're not giving your brain the chance to rest and regenerate. So if you're feeling overwhelmed by work, take a break. You'll feel better—and you might even find some unexpected benefits along the way."



**ACHIEVE MORE BY WORKING LESS**





## BOREDOM HAS ITS BENEFITS

*A wandering mind is a creative mind*

W

hile you're reading this, your mind is probably elsewhere. It's drifting off to other thoughts, daydreaming, or even sleeping. You might feel annoyed by this, but it turns out that a wandering mind is a creative mind.

It's true that people who are bored tend to be more creative than those who are not. In one study, researchers asked participants to sit in a room and do nothing for 10 minutes. Some were told to keep their minds focused on the task at hand, while others were told to let their minds wander. Those who were told to let their minds wander were more likely to come up with creative ideas.

Another study found that people who were bored tended to have more creative ideas than those who were not bored. This was true even when the participants were given a task that required them to be creative. The researchers believe that this is because when people are bored, they have more time to think about other things, which can lead to more creative ideas.

So next time you find yourself feeling bored, don't worry. Instead, let your mind wander and see where it takes you. You never know what creative idea you might come up with.

Andy Rodriguez  
Illustrator

**"Your mind wanders and you daydream and that's really important"**

# THE POWER OF SLOTH

## 1 CLAWS

Sloths are the world's only inverted quadrupeds, hanging from the trees of the tropical rainforests of South and Central America. Their toe bones are not separately movable but bound together by ligaments, which along with their curved "gavs" are efficient tools for dangling upside down. Their muscles have also evolved to suit their lifestyle. They manage almost exclusively with retractor muscles like our biceps, which pull them along the undersides of branches.

## STOMACH

Sloths subsist almost entirely on leaves. These are plentiful in the rainforest canopy, but are full of toxins and cellulose, making them hard to digest. To cope, sloths have evolved a four-chambered stomach, much like a cow's, and employ a host of gut bacteria to digest the leaves. It takes sloths up to a month to break down a single leaf; if it happened any faster than five might not cope, and they'd be in danger of poisoning themselves.

## NECK

Sloths have up to 10 neck vertebrae more than any other mammal. Even the giraffe makes do with just seven. In 2010 scientists at the University of Cambridge discovered that these appear to have evolved from rabbit vertebrae that were co-opted over time into neck bones. The long neck allows nature's rough porcupine to turn its head 770° and graze leaves all around it without wasting precious energy moving the rest of its body.





## BODY TEMPERATURE

Sloths maintain a low core temperature of just 28°C to 32°C, whereas most mammals rely on a toasty 37°C. Rather than keeping themselves warm by stoking their internal combustion engine with calories, sloths wear a dense coat worthy of an Arctic animal. Energy from the sunshine is free, and sloths bask likewards to soak it up like cold-blooded animals. They're also able to withstand fluctuations in their body temperature of several degrees throughout the day.

## CAMOUFLAGE

With an average climbing speed of just 0.16m/s, running from danger is not an option for the slow-moving sloth. They avoid predation with their superb camouflage. Special grooves in the cloacal sac collect water and act as hydrodynamic gardens for as many as 80 different species of algae and fungi, as well as a wealth of insects, giving them a greenish hue. Each sloth is in fact a slow-moving camouflage ecosystem that blends in perfectly with the trees.

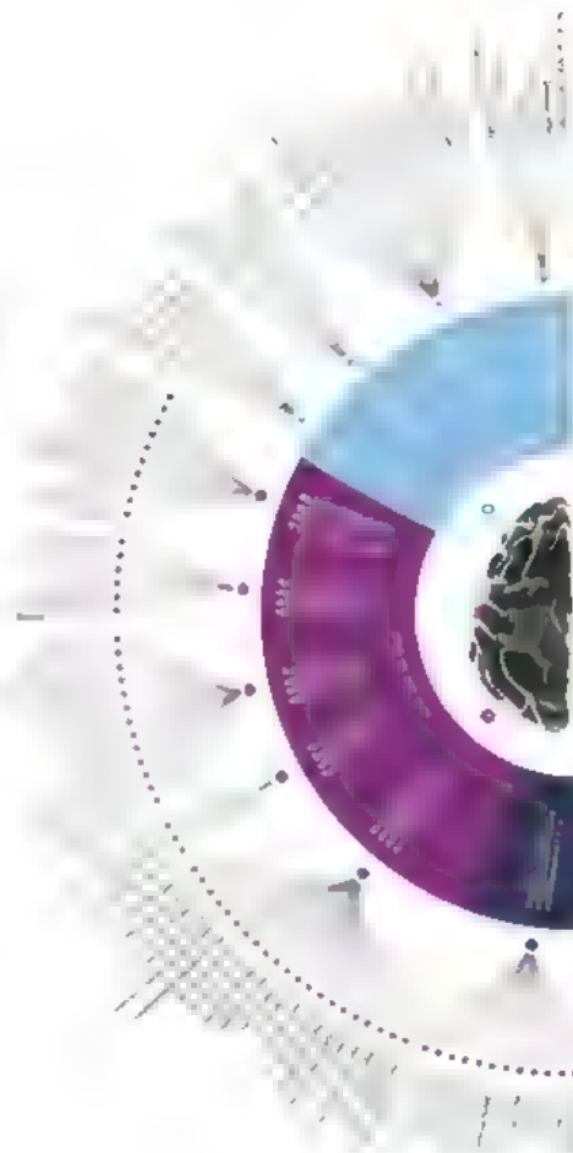
## STICKY RIBS

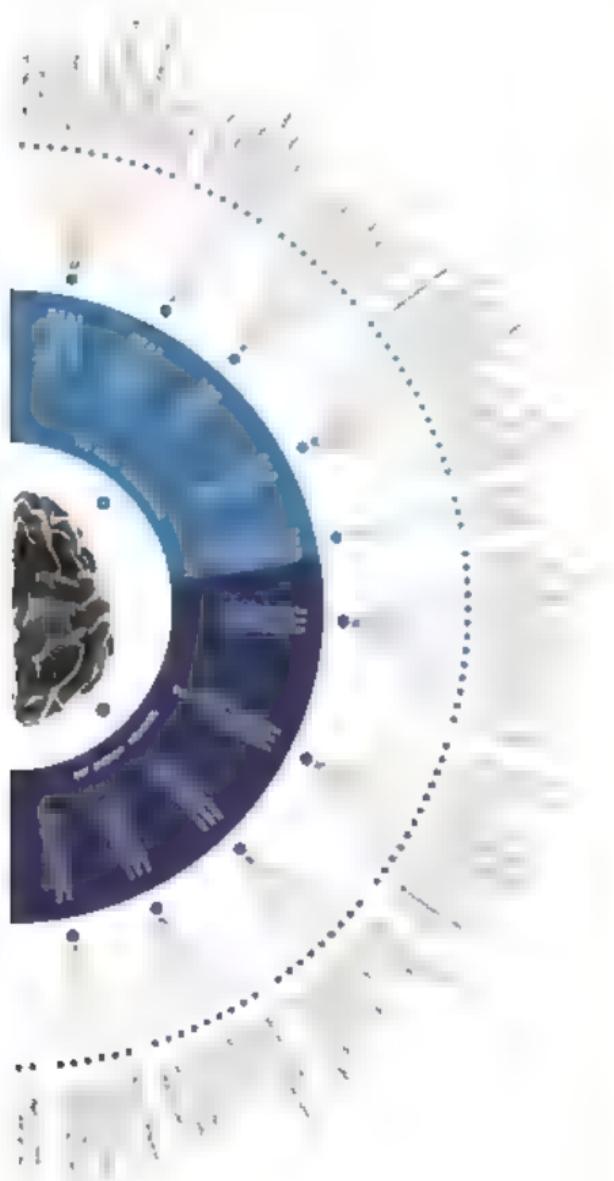
Sloths have evolved bands of tissue that anchor their guts to their lower ribs, preventing their massive stomach, which can make up as much as a third of their body weight in undigested leaves, from pressing down on their lungs. This adaptation makes breathing much less energy intensive; researchers have estimated that the tissue fibres reduce a sloth's energy expenditure by up to 13 per cent, which is a significant amount when you have such a low-calorie diet. ☀

# THE LAZY BRAIN

Our brains are wired like machines, but they're also somewhat lazy. In order to cope with the vast amounts of information streaming through our neurons, our brains have evolved to act as quickly and efficiently as possible - saving both time and energy. But this means that they often get it *very* wrong, as shown in this diagram collecting together all of our common errors in judgment documented by psychologists. These are known as cognitive biases.

ART: JEFFREY RICE  
PHOTOGRAPH: PHILIPPE





II

1

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# YOU SHOULD KNOW BETTER...

Eight lazy shortcuts your brain takes that are worth bearing in mind

By Michael Gazzola

## BANDWAGON EFFECT

Belief	Truth	False
Agree	Don't care	Don't care
Agree	Don't care	Don't care

## FUNDAMENTAL ATTRIBUTION ERROR

Belief	Truth	False
Attributing own behavior	Attributing own behavior	Attributing own behavior
Blame	Blame	Blame
Blame	Blame	Blame
Support	Support	Support
Belief	Belief	Belief



## GOOGLE EFFECT

Belief	Truth	False
Belief	Belief	Belief
Belief	Belief	Belief

## BIKE-SHEDDING EFFECT

Belief	Truth	False
Belief	Belief	Belief
Belief	Belief	Belief

## CONFIRMATION BIAS

Belief	Truth	False
Belief	Belief	Belief
Belief	Belief	Belief

## RHYME AS REASON EFFECT

Belief	Truth	False
Belief	Belief	Belief
Belief	Belief	Belief

## JUST WORLD HYPOTHESIS

Belief	Truth	False
Belief	Belief	Belief

## PLANNING FALLACY

Belief	Truth	False
Belief	Belief	Belief
Belief	Belief	Belief
Belief	Belief	Belief



Dean Burnett

Debt/GDP ratio



baby/rog. bias

# LAZY WAYS TO SAVE THE PLANET

Sure, you could convert your house into a solar-panelled, rainwater-harvesting no-waste eco paradise. But doesn't that all require a bit too much... well... effort? Never fear, these tips can help you greenify your life without breaking a sweat.

Don't wash  
your clothes

Use a milkman

Use a dishwasher



**1 Move in together**

**5 Don't mow your lawn so often**

**6 Drive slower**

**"Typical journeys are just two minutes longer on average when driving at a steady 60mph"**



**7 Work from home****8 Bank online****9 Stop shaving****10 Skip holidays**

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# SPACE

# WARS

FORGET THE

TRADITIONAL  
BATTLEGROUNDS  
OF LAND, SEA  
AND AIR. RAPID  
DEVELOPMENTS  
IN TECHNOLOGY

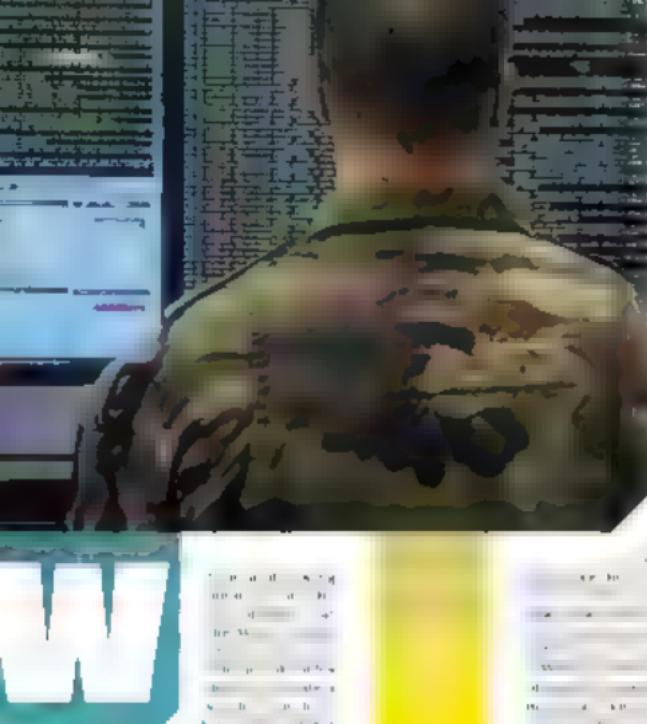
TO NAVIGATION ARE  
PUSHING CONFLICTS

OUT OF SPACE

TO VACUUM TATTOO

TO DILEMMAS

TO DEATH



--



# "EVERY SINGLE DAY WE RELY ON SATELLITES"

We're the first to admit it: It's hard to live in today's world without them. From GPS to communications, the satellite industry is a key part of our daily lives. So how do we keep it running? By getting rid of the bad guys.

Right now, there are more than 1,400 functioning satellites in orbit around Earth, and most of them are controlled by just three major players: the U.S., Russia, and China. These three countries have been developing anti-satellite weapons for decades, and they've already demonstrated their destructive power. In 2007, China shot down one of its own dead satellites with a missile, creating thousands of pieces of orbital debris. In 2013, Russia did the same thing, though its target was a defunct American satellite. Both incidents were a wake-up call for the international community, which has since worked to develop rules of engagement for space warfare.

But the real threat comes from smaller nations like North Korea, Iran, and Pakistan, which are also developing anti-satellite weapons. And while the U.S. has been working on its own defense system, it's clear that we're not alone in this fight. As the world becomes increasingly dependent on satellites, so too does the threat of their destruction.

## KEY TARGETS

WHAT WOULD BE A WEAPONS NIGHT

### COMMUNICATIONS SATELLITES



### GPS



### EACH OTHER'S ANTI-SATELLITE SYSTEMS





## ATTACK TARGETS

100

Год	Население	Площадь	Плотность	Состав
1917	1 000 000	1 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
1926	1 500 000	1 500 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
1939	2 000 000	2 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
1959	3 000 000	3 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
1970	4 000 000	4 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
1989	5 000 000	5 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
1999	6 000 000	6 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
2009	7 000 000	7 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское
2019	8 000 000	8 000 км <sup>2</sup>	1 000 чел./км <sup>2</sup>	Сельское

**REFUSE OUR SATELLITES, DESTROY OUR FRIENDS**

கால  
கால

## **AGREEING ON TERMINOLOGY**

**After it's no hard to keep strong momentum.**

"Your satellite is useless that's where you're wrong. Unfortunately there's a hole in your argument," says Prof. John Johnson-DeVore, at the US Naval War College, Rhode Island. She points out that any satellite with a sensor can be used to map another satellite, even though that's not what it was intended for. This "dual-use" has created problems for astronauts to leave space unarmored. In 1990, the Soviet Space Station crew ratified by count nations of Earth, its prohibition the placement of weapons or military hardware in space. It could work along other lines of

weapons or anti-satellite systems. However, so, in the 2000s there was an initiative sponsored by Russia and China to outlaw the launching of any weapons in space. Russia had a two-stage plan but the US vetoed the treaty: "The US didn't buy into the idea of being able to arbitrarily define a space weapon," says Scott. This, a situation whereis engineers is also the industrial state of the Space Information Infrastructure. According to Scott, the US was also developing space weapons that could be held in reserve and deployed if necessary. In a clear show of strength, in 2007 the Chinese launched satellites that have use of their own satellites to self-destructs. As for the Russians, they've had their own anti-satellite capabilities since the 1980s.

ISRAEL'S SPACEX LAUNCH



## "NEARLY EVERYTHING IN SPACE IS A DUAL-USE TECHNOLOGY"

With the United States and Russia both launching their first commercial flights to the International Space Station this week, it's a good time to consider the role of space technology in our everyday lives. While most people are familiar with the military applications of space technology, many may not realize that nearly everything in space is a dual-use technology, meaning it can be used for both civilian and military purposes. This includes everything from GPS satellites to weather satellites to communications satellites. In fact, the majority of space technology is developed for military purposes, but is then repurposed for civilian use. For example, the GPS system was originally developed for military purposes, but is now used by civilians for navigation and other applications. Similarly, weather satellites are used by both the military and civilians to monitor weather patterns and predict storms. Communications satellites are also used for both military and civilian purposes, such as for telecommunications and surveillance. While the development of space technology is often driven by military needs, it has had a significant impact on civilian life as well. The development of GPS, for example, has revolutionized navigation and has made it easier for people to travel around the world. Weather satellites have helped us better understand and prepare for natural disasters. And communications satellites have made it easier for us to stay connected with each other, no matter where we are in the world. So while space technology may be developed for military purposes, it has had a profound impact on civilian life as well.

# PUT THE MANTIS SHRIMP IN GOAL!

60+ animals that could power up the World Cup

With the World Cup just approaching, we're looking to the animal kingdom for inspiration. If FIFA were to relax the humans-only rule, these are the critters we'd want to take the field.





## MEERKAT

Length: 1 ft  
Weight: 1 lb



## MANTIS SHRIMP

Length: 1 in  
Weight: 1 oz



## HONEY BADGER

Length: 3 ft  
Weight: 10 lbs



## DRAGONFLY

Length: 1 in  
Weight: 1 mg



## PRONG-HORNED ANTELOPE

Length: 4 ft  
Weight: 100 lbs



## KANGAROO

Length: 6 ft  
Weight: 200 lbs

NEANDERTHALS

# RETHINKING THE NEANDERTHALS

A raft of discoveries over the past few years is proving that our ancient ancestors were far from the brutish, primitive species we once thought.

WILLIS BROWN & WHITNEY STYLES





# THEY WERE ARTISTS



#### **THEY HAD FAMILIES!**



It is also a problem that the different measures that are used are not always comparable.

## **THEY WERE CREATIVÉ**



TONY WHITE MURKIN  
Editor, *Washington Correspondent*

On the morning of December 28, 1947, a man named James W. Johnson was found dead in his home in the small town of Rosedale, Mississippi. He had been shot in the head with a .38-caliber revolver. His wife, Mary, was also found dead in their bed, with a bullet wound in her head. The police investigation revealed that Johnson had been a member of the Ku Klux Klan and had been involved in several incidents of racial violence in the area. The case remains unsolved to this day.

## WHY DID THEY DISAPPEAR?

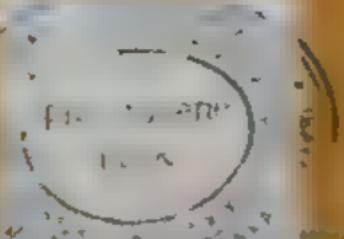
Historical sources clearly attest not just, at least initially, to 200 and 300 per cent of their genes, but to an upward trend. In other former populations of Indians in terms of quantity of DNA, there are others, too. The Cherokee claimed more than these, yet between 1700 and 1800 years ago their total disappeared. From the record, we can question as why did we destroy them like one species, and did the other two escape?

Present theories for our prehistoric ancestors have included a hunting diet, more efficient tool manufacture, and even a mastery of symbolic and art. But these all include certain in light of the evidence described in this article, and it's likely that a number of others played a role.

While Neanderthals had lived through many periods of extreme climate change, the conditions were never as harsh as those experienced by modern humans. Their cognitive and social development was comparable to ours, and they often had larger brains. They also seem to have had a greater potential for change — those over 200,000 years old have been both up and down studies, a few entire human bodies surviving in your world outside the showball date is now impossible. However, especially if Neanderthal's 11<sup>th</sup> genes were more efficient for breeding with us. What this would do is determine whether or not a given Neanderthal population



# BORN



“I’m born again, but I’m not reborn.” —SARAH PALIN

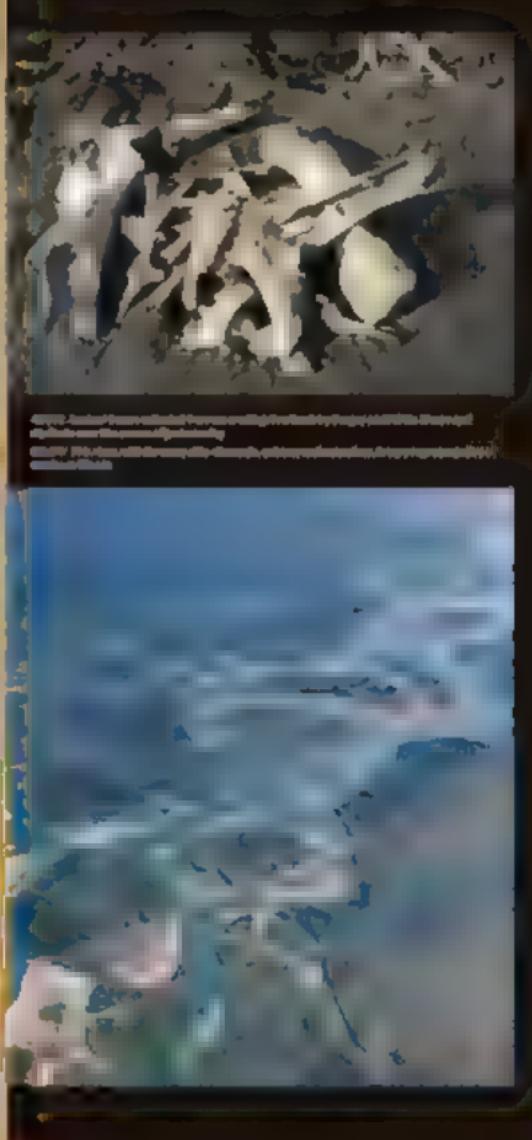




THE PERMAFROST IS DISAPPEARING. AS IT THAWS, BILLIONS OF TUNNELS OF LONG-BURIED CARBON COULD ESCAPE INTO OUR ATMOSPHERE WITH APOCALYPTIC CONSEQUENCES. BUT ONE MAN, HIS SON AND A BUNCH OF IGDN HAVE A PLAN TO RESTORE THE ICE AGE ECOSYSTEM.

ON THIS IC

"WE ARE BARELY APPROACHING THE POINT WHERE THE ARCTIC PERMAFROST WILL START THAWING. THAT WILL BE CATASTROPHIC."





750

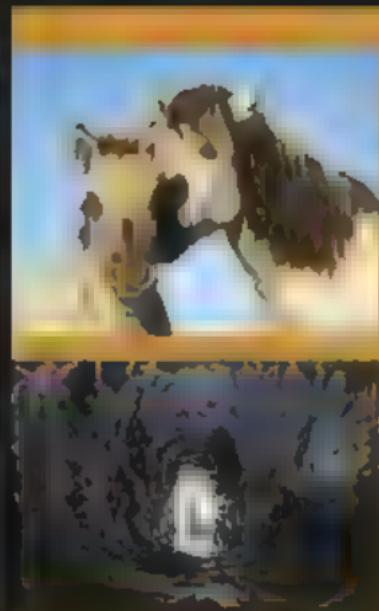
PLAN UFT

It is not known if the animals are able to digest the seeds of the plant, but it is evident that they do not eat them.

#### 4.5 The Impressionist Art Finance and Park

— The *Bombyx*  
adults are found  
frequenting trees and  
bamboo in the winter.

Recomm. the above  
upper at 1000 hours &  
return to the Army  
the ground -  
as there will be no  
possibility of the  
Capt. authorizing  
any more damage  
than previously  
was done, and there  
is no need of  
disrupting the  
relationship with that



“I’m going to be ‘famous’,” he says. He has a plan to make his wife’s “secret” known. “I’m going to tell her I’m going to write a book about it,” he says. “She’ll be like, ‘What? You’re writing a book?’ And I’ll say, ‘Yes, I’m writing a book.’”

He’s not the only one who wants to tell his story. In the last few years, the project has expanded to include more than 100 people from around the world. Some are former patients, some are family members, and some are friends. They all have stories to tell about their experiences with the project.

The project has been successful in helping people with mental health issues. It has helped them to feel better, to feel more connected to others, and to feel more confident in themselves. It has also helped them to feel more supported by their families and friends.

So if you’re looking for a way to help someone with mental health issues, consider reaching out to the project. You never know what kind of difference you could make.

## “IT WAS LIKE AN ARCTIC SERENGETI. MODERN HUMANS DIDN'T NEED TO WORRY ABOUT FOOD; THEY NEEDED TO WORRY ABOUT BEING TRAMPLED”

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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① **Illustration:** Typical tasks  
involving the visual system:  
perception of objects in  
the environment, processing  
of visual information, and  
production of visual output.

② **Illustration:** Typical tasks  
involving the auditory system:  
perception of sounds in  
the environment, processing  
of auditory information, and  
production of auditory output.

③ **Illustration:** Typical tasks  
involving the olfactory system:  
perception of odors in  
the environment, processing  
of olfactory information, and  
production of olfactory output.

④ **Illustration:** Typical tasks  
involving the gustatory system:  
perception of tastes in  
the environment, processing  
of gustatory information, and  
production of gustatory output.

⑤ **Illustration:** Typical tasks  
involving the tactile system:  
perception of touch in  
the environment, processing  
of tactile information, and  
production of tactile output.

# ECOSYSTEM ENGINEERS

*It's not just Siberia that can reap benefits from introduced animals*



In 1988, a golden rat was introduced to Holland from the sea and pirate Ruytenbergh Island in the Netherlands was chosen to release a marsh vole (Apodemus agrarius) population. Much time and effort were

introduced to monitor the growth of invasive herbivores. They created permanent grasslands that provided habitat for ground nesting birds, but the deer were still active in 2016, growing fat at dinner and to be shot when they became mismanaged all winter.

This was not enough because the deer population was jumping — and this highlighted the need for predators to regulate herbivore numbers.



In 1990, the owner of a living history farm was visited by the first, naming Angeln, after a famous former Roman soldier and general. Since then nature has given us the animals have adapted to the changing environment, with the breeding success story now boasting 100,000 butterflies and growing each year. With 10 million British a year, a large population of purple emperors butterflies

is off to a good start.

When wolves were reintroduced to Yellowstone National Park in 1995 after a 20-year absence, things changed rapidly. The big, hairy carnivores started to hunt the steep-sided valleys where they could be trapped by the wolves. In these areas regenerating aspens, willow, and trees died off. Then more omnivorous herbivores in waterways like moose, elk, and their calves, bison, and bears reappeared, built dams and created ponds that increased habitats for fish, amphibians, and reptiles. The deer were killed, resulting in an increase in small mammals which attracted weasels, foxes, and birds of prey. From an ecological perspective, the wolves were a hunting success.





● evolution of woolly mammoths  
provides a lesson for climate change  
and global warming. By understanding  
the biology of these ancient animals,  
we can better predict what  
will happen to our own species  
as the world warms.  
The woolly mammoth  
was a cold-adapted  
mammal that  
survived in  
extreme  
environments for  
millions of years.

#### MAKE A MAMMOTH

Want to make a woolly mammoth? Start by learning about the biology of these ancient animals. Then, use that knowledge to create your own woolly mammoth. You'll need some basic supplies, like a large container, soil, and water. You can also add some decorations, like sticks or leaves, to make your mammoth look more realistic. Finally, you can add some accessories, like a trunk or tusks, to complete your creation. With a little imagination and creativity, you can make a woolly mammoth that is both fun and educational.

AN ANCIENT ANIMAL  
AND ITS SURVIVAL STRATEGIES  
CAN TEACH US  
ABOUT CLIMATE  
CHANGE AND  
WHAT WE CAN DO  
TO ADAPT.

Left:  
Illustration by Lorraine  
Church. © 2021  
by the author and  
illustrator. Used  
with permission.

"THE RESULT WILL  
NOT BE A PURE  
WOOLLY MAMMOTH,  
BUT A HYBRID THAT IS  
A COLD-ADAPTED  
ELEPHANT"

Want to make a woolly mammoth? Start by learning about the biology of these ancient animals. Then, use that knowledge to create your own woolly mammoth. You'll need some basic supplies, like a large container, soil, and water. You can also add some decorations, like sticks or leaves, to make your mammoth look more realistic. Finally, you can add some accessories, like a trunk or tusks, to complete your creation. With a little imagination and creativity, you can make a woolly mammoth that is both fun and educational.



**"LIKE WOOLLY MAMMOTHS,  
BISON ARE A KEYSTONE  
SPECIES. THEY CAN FASHION  
ENTIRE ECOSYSTEMS"**

	$\alpha$	$\beta$	$\gamma$	$\delta$	$\epsilon$	$\zeta$	$\eta$	$\theta$	$\varphi$	$\psi$	$\chi$	$\omega$	$\nu$	$\mu$	$\rho$	$\sigma$	$\tau$	$\lambda$	$\kappa$	$\pi$	$\omega$	$\nu$	$\mu$	$\rho$	$\sigma$	$\tau$	$\lambda$	$\kappa$	$\pi$	
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$\beta$	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
$\gamma$	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
$\delta$	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			
$\epsilon$	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				
$\zeta$	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					
$\eta$	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30						
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$\mu$	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30													
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$\sigma$	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30															
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$\kappa$	19	20	21	22	23	24	25	26	27	28	29	30																		
$\pi$	20	21	22	23	24	25	26	27	28	29	30																			



Number	Is it a vowel or consonant?	How many letters are there?	What is the letter?
1	vowel	1	a
2	vowel	1	e
3	vowel	1	i
4	vowel	1	o
5	vowel	1	u
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7	consonant	2	ch
8	consonant	2	sh
9	consonant	2	ck
10	consonant	2	ng
11	consonant	2	tr
12	consonant	2	dr
13	consonant	2	fr
14	consonant	2	br
15	consonant	2	cr
16	consonant	2	gr
17	consonant	2	pr
18	consonant	2	tr
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Autumn 2000

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பிரபுவும் முதல் தீடு  
குறிப்பிட வேண்டும் என்று  
பிரபுவும் முதல் தீடு  
குறிப்பிட வேண்டும் என்று

24

**International Institute of  
Moral Science and  
Philosophy**

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1968

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Dr. Michael Pfeifer

第十一章

By P. J. Martin et al. Published 2001

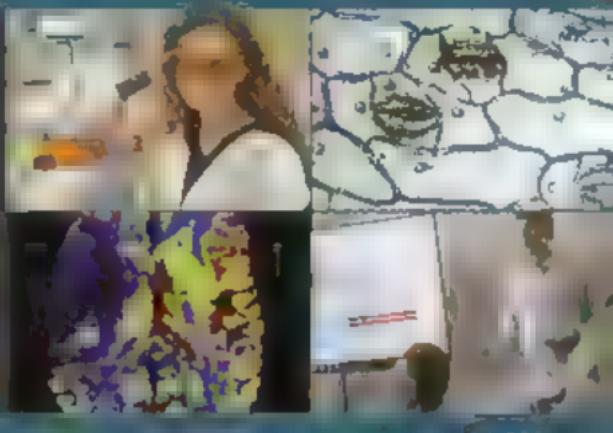


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## YOUR QUESTIONS ANSWERED

### Why (and how) does dew form?

INTERVIEW BY

Q	A	Q	A	Q	A	Q	A	Q	A
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
20.	21.	22.	23.	24.	25.	26.	27.	28.	29.





## Do any other animals play music?

By Shiloh Lee

Playing musical instruments may not be unique to humans. In fact, it's been found that some animals can play instruments too. For example, a dog named Kuma can play a harmonica. In that same publication, it also mentioned that a cat named Gato can play a harmonica. These animals are trained to play by their owners. But there are also animals that play instruments without being trained. For example, a parrot named Bluey-Song can play the drums & the xylophone. So, who knows what other animals can play instruments?



## Why does laundry smell bad? If it's been hung up outside?

By William Pease, nominated

Unless you wash clothes on a CPC spin, they will still have bacteria trapped in their fibers. The warm, damp conditions after the clothes come out of the machine will encourage growth of the bacteria, and the waste compounds they excrete will create a stale, funky smell. Hang clothes, clothes generally dry much quicker, and the ultraviolet light from the sun kills bacteria quite effectively. In spring and summer, clothes might also trap plant-exuding volatile organic compounds released by plants, or

## What do the other planets smell like?

By Samira



It's been determined that the atmosphere of Mars has methane, which is a gas that is produced by living organisms. This means that there could be life on Mars. There are also signs of water on Mars, which is another indicator of life. Venus is known to have sulfuric acid rain, which is very corrosive. It's also very hot on Venus, with temperatures reaching up to 867 degrees Fahrenheit. Venus is covered in clouds of sulfuric acid, which reflects most of the Sun's light back into space. Venus is also tilted on its axis, which causes extreme seasonal changes.



## Why are cats scared of cucumbers?

By Samira

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#### **Could climate change turn North into Yunnan?**

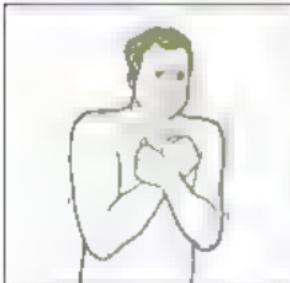
BRUNSWICK GROUP

Venard's atmosphere is 100 ppm  $\text{CO}_2$  without dioxide, driving a powerful greenhouse effect that creates surface temperatures above 60°C. Venard's atmosphere, on the other hand, converts only about one percent carbon dioxide, with trace amounts of other greenhouse gases. While greenhouse gas concentrations have been rising on pre-industrial levels, they are still far from Venard's levels. If we were to burn off all available fossil fuels, the likely impact on our planet's temperature would be a 10°C rise. This may over-work by Venard's numbers, but it would nonetheless increase global temperatures more than 100 degrees.



## THE THOUGHT EXPERIMENT

## **WHAT IF HUMANS HAD CHLOROPHYLL IN THEIR SKIN?**



**LAW STUDIO**

Photosynthesis is only 5 to 6 percent efficient if you stand still and sit all day. You would generate less than 240 Joules about three chocolate digestive biscuits worth if you were sitting all day to supplement this, photosynthesis wouldn't even be enough to offset the heat your naked body would lose. You'd die of hypothermia before you starved.



2019-2020 学年下学期

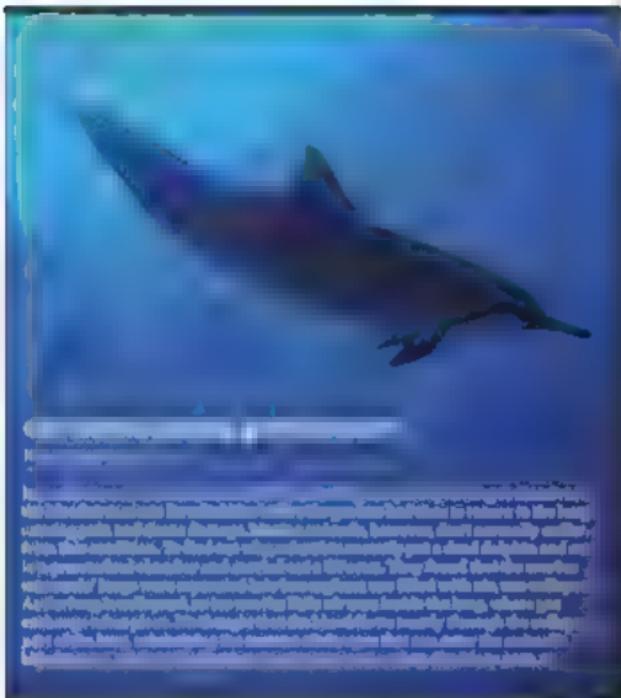
Plants generate all of the oxygen they need as a by-product of their own photosynthesis. But since you'd need to eat extra food to power your more active metabolism, you'd also need to breathe extra oxygen in order to convert all of that food into energy. Photosynthesis would let you lower your breathing rate by 10 percent at most. Photosynthetic astronauts would still need oxygen as well.



• 第四章 計算機的運算

Most plants need light to synthesize chlorophyll. If humans used the same mechanism our skin would rarely be green where it was exposed to the sun. Office workers and many people in northern latitudes probably wouldn't get enough sunlight to turn their skin more than olive-yellow even if they ate lots of leafy greens.

**These working rolling shifts might cycle between green and white.**



## **Why do we find puppies so cute?**

2020-01-20

With me will be the men  
and women here,  
the people who  
have given us  
our freedom;  
but above all  
will be the God  
of our fathers.  
He will be with us  
in this battle,  
as He was with us  
in all our battles  
in the past.  
He will give us  
victory over  
our enemies.  
We must trust  
in Him, and  
not in ourselves.  
He is the One  
who can save us.



Leave our Q&A  
page? Follow our  
Twitter feed  
[@ScienceBeechQ&A](#)

## Why are some materials magnetic?

Asked by: A. H. M. A.

P	d	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
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Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe
Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe
Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe

## What causes both bombs to fizz?

Asked by: A. H. M. A.

H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z					
He	Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe
He	Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe
He	Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe
He	Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe
He	Li	Be	B	C	N	O	F	Ne	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe

# ...I DON'T GET ENOUGH SLEEP?

Sleep is not just a passive rest. Your body uses the downtime to perform essential repair and growth, and short-changing yourself at night has dire consequences for your health. Studies have found that chronic sleep deprivation can double your risk of fatal cardiovascular disease, suppress your immune system and make you 30 per cent more likely to become obese. Overall those who regularly get less than five hours of sleep per night are 15 per cent more likely to die in any given year than a person who has all the same health risk factors apart from the sleep deficit.



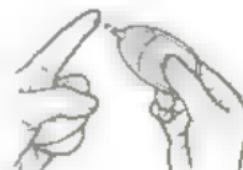
## 1. Bags under your eyes

Levels of the stress hormone cortisol increase while blood flow to the skin – that shows up as dark, puffy patches under your eye – when the body is stressed. Still, it's better to do the fix.



## 2. Loss of perspective

With so much fuel at the amygdala region of the brain, which regulates emotional tends to overreact to negative stimuli, you're more angry and irritable. It also leads to sharp decreases in



## 3. Diabetes

You metabolize glucose more slowly when you are tired... this increases your risk of developing type 2 diabetes.



## 4. Heart disease

The complex interaction of stress hormones increased blood pressure and reduced glucose metabolism increases your risk of heart disease.



## 5. Obesity

Raised cortisol levels (the "fight-or-flight" hormone) stimulate you to eat up to 25 per cent more, and you will tend to prefer carbohydrate-rich foods.



## 6. Muscle aches and twitches

Neurotransmitter in your nerve synapses build up over the day... slowly. Without enough sleep regularly, this vital muscle will twitch periodically.



## Is it possible to get pregnant when you're already pregnant?

BY LINDA MCKEE

## IN NUMBERS

---

WHAT IS TIME?

---



Time is a mysterious  
entity that we all experience  
but can't quite define. It's a  
giving concept that's constantly  
changing and yet it's the same  
thing throughout the universe.  
It's a complex idea that's  
hard to pin down, but it's  
essential to our understanding  
of the world around us.



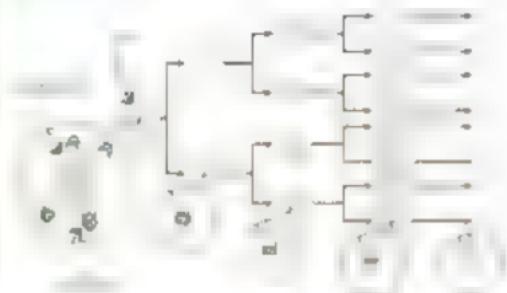
**WHO FIRST CLAIMED IT?**

# **PLANETS GO ROUND THE SUN**



## Is there a theoretical upper limit to human life?

第十一章 人物传记



**Does it take more effort to swim in the deep end of a pool than the shallow end?**

中行与中庸

# WHAT SHAPES OUR MUSIC TASTE?

We teamed up with the folks behind BBC World Service's *CrowdScience* to answer your questions on one topic. You can tune in to *CrowdScience* every Friday evening on BBC World Service, or catch up online at [bbcworldservice.com/crowdscience](http://bbcworldservice.com/crowdscience)

## Can you train your brain to like different music?

You might have tried – but research by neurologist Dr. Alice-Madeline Chesterton has shown that the answer is: *sort of*. In her thesis, *Training Musical Preferences: Can We Train Our Brains to Like Different Music?*, she found that people can learn to like more unusual music. Specifically, she found that people who listen to unconventional music have the same genes as those who influence strong music preferences. So, going to gigs at the University of Birmingham over the last year or so, it's possible to have strong musical taste that allows them to enjoy unusual forms of music – a skill that develops at around the age of 18.

## Why do people have such different music tastes?

As far as all cultures we've seen so far are concerned, there are typical musical patterns and a typical listening pattern. But when you look around at more cultures around the globe, things are extremely different, with a greater number of them than the others. Why? There is likely to have to be some genetic basis. This paper suggests this entirely, because it relates the audience's musical preferences to genetic variants. So, those preferences are shaped by the people's genetics. We identify with our culture in the way that we identify with our ethnicity, race, gender, & so on. It's very likely, however, that our culture is likely to influence this, in essence, in whether we're there emotionally, or analytically inclined.



## Why do we get so nostalgic about music?

It's part of the "emojis of the bump" – psychologists have shown that we tend to remember the emotions from our teenage and early adult years, and that those emotions are often positive. Involving love, fun, years that we were young and happy. There are songs that are unique in adolescence, especially if learned before age 10, and they imprint very strongly in the brain. Research has shown that the brain tends to store those songs that we play less often, and that in adolescence, when you play the blues, we do adolescent tends to be less intense and more sophisticated, such as jazz and classical.



Niamh Chesterton

## How long would it take an astronaut to travel from Earth to the Moon?

From the GAT



The number of days it would take to travel from Earth to the Moon depends on the route taken. The most direct route is a straight line from the center of the Earth to the center of the Moon. This distance is approximately 384,400 km. If an astronaut traveled at a constant speed of 10 km/s, it would take about 40 hours to reach the Moon. However, this is not a practical route because it would require traveling through the atmosphere of the Earth, which would be dangerous for the astronaut.



## Are VR headsets bad for your health?

From the GAT

	Yes	No	Don't know	Don't care
Male	40%	50%	10%	0%
Female	50%	40%	10%	0%
Total	45%	50%	5%	0%
16-24 years old	50%	40%	10%	0%
25-34 years old	45%	50%	5%	0%
35-44 years old	40%	50%	10%	0%
45-54 years old	35%	55%	10%	0%
55-64 years old	30%	60%	10%	0%
65+ years old	25%	70%	5%	0%
High school or less	45%	50%	5%	0%
Postsecondary or more	40%	55%	5%	0%
Employed	40%	55%	5%	0%
Not employed	50%	40%	10%	0%
Single	45%	50%	5%	0%
Married	40%	55%	5%	0%
Other	40%	50%	10%	0%

### QUESTION OF THE MONTH

## What is the Universe expanding into?

From the GAT

Presently we do not know (and may never know) whether the Universe is infinite or not. If the Universe is infinite, then it was simply being expanding without getting any bigger because you can't get bigger than infinity. It's therefore not expanding into anything. On the other hand, if the Universe is finite to itself, this question becomes impossible to answer, since – being part of the fabric of the Universe – we have no way of looking outside it. At





## WHY DOES SAND GO DRY WHEN YOU STEP ON IT?

**T**he answer to this question is quite simple. When you step on sand, you are applying pressure to it. This pressure causes the sand particles to move closer together, which creates more space between them. As a result, there is less air trapped in the spaces between the sand particles. This lack of air causes the sand to feel dry and powdery under your feet.

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DR HELEN CZERSKI

# OUT THERE

WHAT WE CAN'T WAIT TO DO THIS MONTH

01

IMAGINE MARS  
BODY PARTS CRYONIC  
SHIP NOW  
[www.videoproject.com](http://www.videoproject.com)

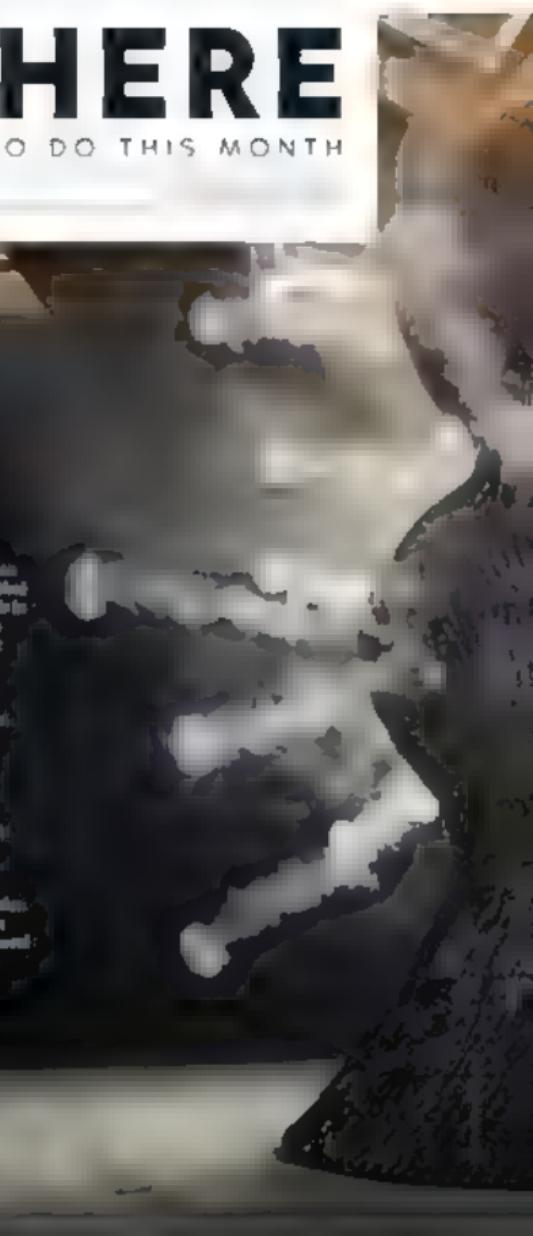
## MARVEL AT THE INVISIBLE

Who remembers the *Vide Project's* new permanent exhibition called *Invisible Worlds*—mashups the parts of the planet that exist beyond our vision? A continuation of *Invisible Worlds*—*Visible Mars*, which is an interactive, 3D-video installation that celebrates cyanobacteria. Why should we care about them? Well, they are the organisms that gave us a living, breathing world when they started to photosynthesize around 2.4 billion years ago, releasing free oxygen into Earth's atmosphere and changing the nature of our planet.

Invisible Mars features 3D cameras that project colored vapor rings, which were developed to represent the origins of the primordial world. To create the music, videographers Shadi Nafis collaborated with Puerto Rican producer Jason Grismado.

"Visible Mars gives physiognomy to the invisible elements; our existence depends on our breathable atmosphere, microbial life and tiny stars," says Shadi Nafis.

Nowhere, you can go as far as to discover various extremes and what they do you can become part of the *Vide Project's* digital installation and watch on mother Earth in and out of your body; and then you can land vehicles to travel through *Vide's* Chichen Gordons and know where in the 20,000 bacteria we take every day.





## UNDERSTAND SIN

For more information about the National Research Council's work in this area, please visit [www.nap.edu](http://www.nap.edu).

THE SCIENCE  
OF SPIN  
By Alan M. Krueger

SCIENCE  
SIM

१०५

Что же это? Кто же это? Давайте смотреть вниз.  
Из склонов горы?

**Can you tell if someone's cheating  
by listening at their door?**

which other sine curve the  
45°E is a part of?

Number	Symbol	Value	Symbol	Value
1	one	1	two	2
2	two	2	three	3
3	three	3	four	4
4	four	4	five	5
5	five	5	six	6
6	six	6	seven	7
7	seven	7	eight	8
8	eight	8	nine	9
9	nine	9	ten	10

Can we know divine activity in any other way than from the record of history?

#### **What can you do about it?**



AUTHOR'S  
BOOKLET



The Wall Street Journal

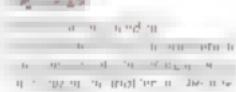
תלמוד תורה



THE BRAIN THAT  
CHANGED MY LIFE



四百三



FIND OUT MORE

• [www.sciencenewsforkids.org](http://www.sciencenewsforkids.org)



LIVE AT THE EDGE.

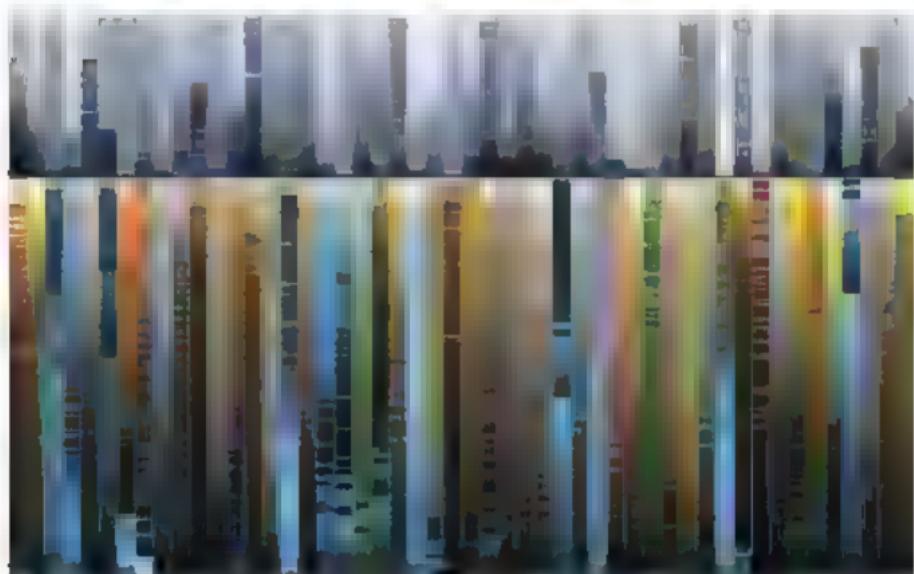
BY DAVID FERGUSON

DUBLIN SCIENCE CENTER.COM

## EXPERIENCE THE EXTREME

Practicing your skills in the extreme can help you become a better athlete. Here's how.

The Wright brothers' first flight at Kitty Hawk, North Carolina, in December 1903 was a success. But it wasn't the first time they had tried to fly. In fact, they had failed many times before they succeeded. This is true of most great achievements. Success is often the result of many failures.

THE GENESIS  
OF ACCIDENTS

## CELEBRATE ACCIDENTS

The Wright brothers' first flight at Kitty Hawk, North Carolina, in December 1903 was a success. But it wasn't the first time they had tried to fly. In fact, they had failed many times before they succeeded. This is true of most great achievements. Success is often the result of many failures.





## LEARN THE SECRETS OF THE MILLENNIUM SEED BANK

### NEW SCIENCE FESTIVAL

21

21 October	22 October	23 October	24 October	25 October	26 October	27 October	28 October	29 October	30 October	31 October
10.00–11.00am										
11.15–12.15pm										

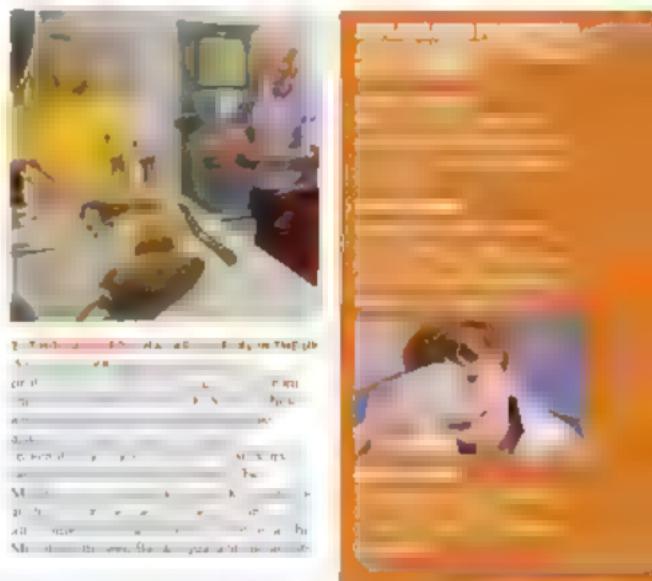
### THE WILD CHILD: ANNEKE VAN DER MEULEN

22

Van der Meulen's new book, *The Wild Child*, is a collection of photographs of children from around the world who have been separated from their families. She has travelled to countries such as India, Mexico, and South Africa to document these cases. The book aims to raise awareness about the issue of child abandonment and the challenges faced by these children.



22 October	23 October	24 October	25 October	26 October	27 October	28 October	29 October	30 October	31 October
10.00–11.00am									
11.15–12.15pm									
1.30–2.30pm									
2.45–3.45pm									





## LISTEN UP

LIVE in the countryside? Tied up in the evenings? Too busy simultaneously watching your children, passing a bucket and painting the kitchen, trying to go to any events? You need to get your science fix via a podcast. Here are our favourites.



### SCIENCE FOCUS

If you want to mix science facts with slightly updated theory, this is the perfect fit. Hosted by Brian Cox and Robin Ince, it's refreshingly irreverent and interesting. Whether you want to learn about things you never knew or just want to keep up with what's new in science, it's got you covered.



### INVISIBILIA

Exploring the hidden forces that shape human behaviour, each episode ideas a surprising and unusual human trait. Some startling studies have proven where men in deaf-learning interfere with their life and a woman who feels noted



### SCIENCE FOCUS PODCAST

Since we're obsessed, but we think that's a good thing. Each week a Bell Curve team member has a deep dive that will either challenge your preconceived notions or break through them. We'll explore ideas and breakthroughs that influence our understanding of the world.



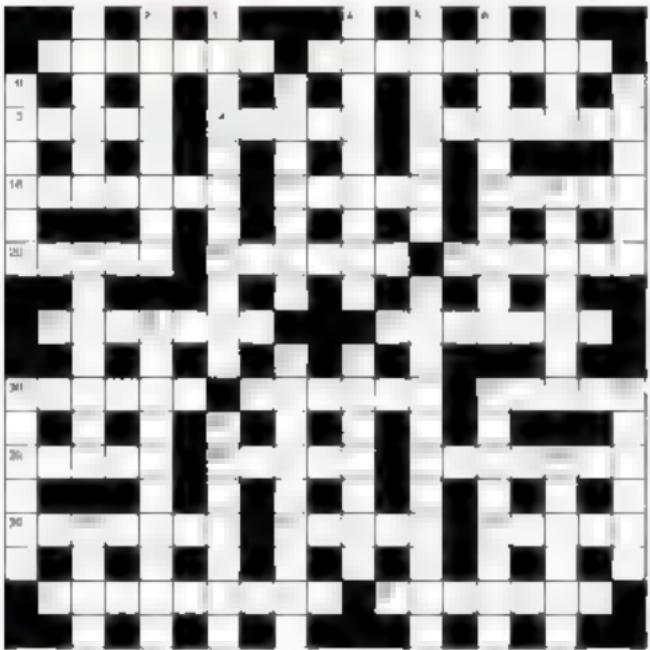
# ESCAPE EARTH

MOON, MARS  
AND BEYOND

Fri 9pm

What	does	it	mean	to	you	in	the	universe
life	exists	elsewhere	in	the	universe	?	?	?
artificial	intelligence	is	real	?	?	?	?	?
black	holes	are	black	?	?	?	?	?
space	is	dark	?	?	?	?	?	?
space	is	empty	?	?	?	?	?	?

# BBC FOCUS CROSSWORD G V E Y O R B R A N A W O R K O U T



9 Sunday 14<sup>th</sup> di-verticulitis & embolic stroke  
10 All 4 new immigrants about the Spanish plant (5)  
11 3rd child born - 1st time - single (5)  
12 Beer withdrawal (5)  
13 Dried up - very dry skin - hand cracked (5)  
14 Skin - about 10% of skin is itches (5)  
15 Answer - say no patroage (5)  
16 Maneuvered - brain (5)  
17 From one - one - something explosive (5)  
18 Dogtooth (5)  
19 Temporary set-back of the diaphragm (5)  
20 Weep when fat (5)

Daughter is elated. One is  
 10 her ring 2nd and right hand  
 11 she can't believe it  
 12 I am so glad we are engaged.  
 13 I'm 4' 4" and 175 lbs.  
 14 She is 5' 2" and 135 lbs.  
 15 They are engaged.  
 16 They are engaged.  
 17 They are engaged.  
 18 They are engaged.  
 19 They are engaged.  
 20 They are engaged.  
 21 They are engaged.  
 22 Happy and in love gravity my sweetie  
 23 I'm 4' 4" and 135 lbs.  
 24 I'm 5' 2" and 175 lbs.  
 25 Diamond ring down in the country?

AMEMBERS

For the answers, visit  
<http://BBCBiologyW>  
Digital resources available.  
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# GALAXY ON GLASS

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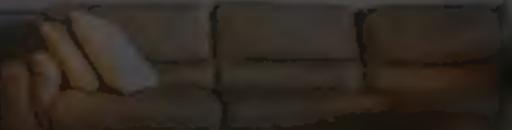
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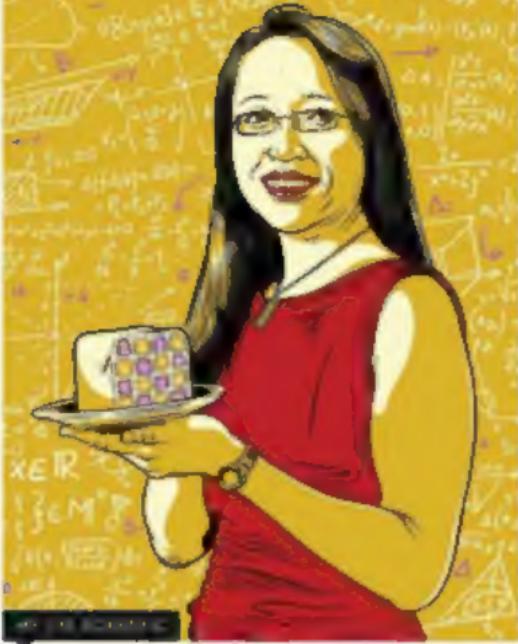
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## Dr Eugenia Cheng

Mathematician and pianist Eugenia Cheng talks to Helen Pilcher about maths, music, cake, and why it's good to get things wrong

### What do you do?

I teach, talk and write about maths, and research abstract algebra. I'm also on a mission to end the world of Mathsphobia.

### Why are people maths phobic?

Part of the problem is the way maths is taught. So much is about following rules and getting the right answer, but this can be confusing. If kids get things wrong it can make them feel stupid, so it's off-putting.

### How should maths be taught?

We should teach maths so it's less about getting the right answer, and

more about investigation and discovery. Maths isn't just about numbers, it's about thinking. I teach students university art students by getting them to do stuff out and stick it together. They discover that triangles are a good shape for covering surfaces. That's quite a profound mathematical insight. In my ideal scenario the education system would focus less on test results and trust teachers to know how the students are doing. Food can be motivating too.

### Mmm... yum! I'm maths of cake!

Why not? Food can be really

motivating. Maths is like cooking. You add different things together and see what you get. I use Battenberg cake when I'm teaching group theory to my second year maths students because its structure is a picture of high level maths.

### More do you play?

I'm a classically trained pianist, so I play the piano. I play Bach every day because it aligns my brain and satisfies my soul, but I also enjoy Debussy because it's less technically challenging but musically fulfilling.

### Aren't maths and classical music both a bit higherbrow?

People often think that maths they've studied them and passed tonnes of exams, those subjects are off limits. That's a shame. You don't need to be able to do maths or play music, in order to appreciate it, just like you can go into a museum and appreciate paintings without being an artist. I try to bring classical music to a wider audience.

### Are maths and music linked?

They're both about structure. You need to understand the internal structure of a complicated piano piece or mathematical problem in order to get your head around it.

### Any bad habits you'd care to admit?

I'm a spectacular procrastinator. There are often times when I get stuck at work and the only thing that gets stuck is me having something to eat. I find that really annoying.

### Where is your favourite place?

I love being by the sea. I grew up in Brighton so I have an affinity to seaside lunches. I also love the beach in New, where I worked for a year. It's like Brighton, but warmer. ☺

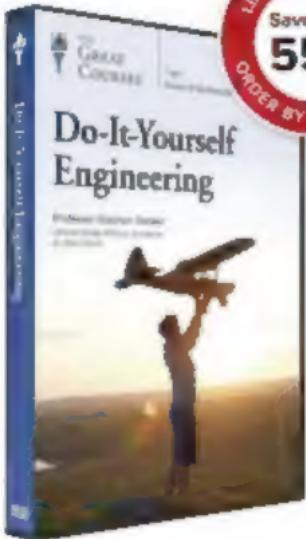
**Dr Eugenia Cheng** is a scientist in residence at the School of the Art Institute of Chicago. Her new book, *The Art of Logic: How to Make Sense in a World That Doesn't* (£14.99, Profile Books) is out now.

### DISCOVER MORE

To listen to an episode of The Life Scientific with Eugenia Cheng, visit [bit.ly/eugenia\\_cheng](http://bit.ly/eugenia_cheng)

NEXT ISSUE: ALICE ROBERTS

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4. Bridging with Beams
5. Make a Suspension Bridge
6. Design a Concrete Sailboat
7. Get Set!
8. Make a Radio-Controlled Bump
9. Exploring Aerodynamics
10. Build a Model Airplane
11. Take Flight!
12. Build a Model Helicopter
13. This Is Rocket Science
14. Build a Rocket
15. Make an Electric Launch Controller
16. Let's Do Launch!
17. A Tale of Three Catapults
18. Build a Ballista, Onager, and Trebuchet
19. Design a Hydraulic Arm
20. Make a Water Turbine
21. Design a Gear Train
22. Make a Mechanical Clock
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